ASME B107.500-2010

(Incorporation and Revision of ASME B107.11, B107.13, B107.16, B107.18, B107.19, B107.20, B107.22, B107.23, B107.24, B107.25, B107.27, and B107.37)

Pliers

AN AMERICAN NATIONAL STANDARD

INTENTIONALLY LEFT BLANK

标准分享网 www.bzfxw.com 免费下载

ASME B107.500-2010

(Incorporation and Revision of ASME B107.11, B107.13, B107.16, B107.18, B107.19, B107.20, B107.22, B107.23, B107.24, B107.25, B107.27, and B107.37)

Pliers

AN AMERICAN NATIONAL STANDARD

ASME
SETTING THE STANDARD

Three Park Avenue • New York, NY • 10016 USA

Date of Issuance: January 7, 2011

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

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Periodically certain actions of the ASME B107 Committee may be published as Cases. Cases and interpretations are published on the ASME Web site under the Committee Pages at http://cstools.asme.org as they are issued.

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not "approve," "rate," or "endorse" any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assumes any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

No part of this document may be reproduced in any form,
in an electronic retrieval system or otherwise,
without the prior written permission of the publisher.

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

Copyright © 2011 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All rights reserved
Printed in U.S.A.

标准分享网 www.bzfxw.com 免费下载

CONTENTS

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.

The purpose of B107.500 is to define essential performance and safety requirements for several types of pliers, including long nose pliers, shears, electronic pliers, and wire cutters. It specifies test methods to evaluate performance related to the defined requirements and safety and indicates limitations of safe use.

This Standard may also 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 instruments covered.

This Standard includes the following:

B107.11 Pliers: Diagonal Cutting and End Cutting, approved by the American National Standards Institute on December 4, 2008

B107.13 Pliers: Long Nose, Long Reach, approved by the American National Standards Institute on April 16, 2003

B107.16 Shears (Metal Cutting, Hand), approved by the American National Standards Institute on December 4, 2008

B107.18 Pliers: Wire Twister, approved by the American National Standards Institute on December 4, 2008

B107.19 Pliers: Retaining Ring, approved by the American National Standards Institute on May 25, 2004

B107.20 Pliers: Lineman's, Iron Worker's, Gas, Glass, Fence, and Battery, approved by the American National Standards Institute on October 5, 2004

B107.22 Electronic Cutters and Pliers, approved by the American National Standards Institute on December 4, 2008

B107.23 Pliers: Multiple Position, Adjustable, approved by the American National Standards Institute on February 19, 2004

B107.24 Pliers: Locking, Clamp, and Tubing Pinch-Off, approved by the American National Standards Institute on November 8, 2007

B107.25 Pliers: Performance Test Methods, approved by the American National Standards Institute on November 8, 2007

B107.27 Pliers: Multiple Position, Electrical Connector, approved by the American National Standards Institute on May 1, 2003 (R2008)

B107.37 Pliers: Wire Cutters/Strippers, approved by the American National Standards Institute on November 8, 2007

In addition to the consolidation of these individual pliers standards into this Standard, principal changes are the uniform inclusion of performance requirements and test methods that evaluate both performance and safety, as well as a uniform format for sections on definitions, references, performance requirements, tests, and safety requirements and limitations of use.

Members of the Hand Tools Institute Pliers 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 is acknowledged and appreciated.

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 Standards Committee, 3 Park Avenue, New York, NY 10016-5990.

This incorporation and revision was approved by the American National Standards Institute on June 14, 2010.

标准分享网 www.bzfxw.com 免费下载

ASME B107 COMMITTEE
Hand Tools and Accessories

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

STANDARDS COMMITTEE OFFICERS

W. T. Pagac, *Chair*
J. S. Foote, *Vice Chair*
T. W. Schellens, *Secretary*

STANDARDS COMMITTEE PERSONNEL

N. C. Cantlon, Jore Corp.
J. D. Davidson, Sears Holdings Corp.
J. Apida, *Alternate,* Sears Holdings Corp.
P. A. Desmarais, Danaher Tool Group
D. M. Eggert, Snap-On, Inc.
J. S. Foote, Trade Association Management, Inc.
D. S. McKittrick, *Contributing Member,* McKittrick
G. E. Olson, Gene Olson Engineering Consultant Ltd.
W. T. Pagac, Forever Associates
T. W. Schellens, The American Society of Mechanical Engineers
W. C. Snyder, Wright Tool Co.
J. M. Ster, General Services Administration Heartland Global Supply
J. F. Chaney, *Alternate,* General Services Administration Heartland Global Supply
H. Yin, Stanley Black & Decker, Inc.

SUBCOMMITTEE 5 — PLIERS AND SNIPS

D. S. McKittrick, *Chair,* McKittrick
J. F. Chaney, General Services Administration Heartland Global Supply
J. M. Ster, General Services Administration Heartland Global Supply

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

Secretary, B107 Standards Committee
The American Society of Mechanical Engineers
Three 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 for the purpose of providing 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, 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.

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 that 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.

标准分享网 www.bzfxw.com 免费下载

ASME B107.11

PLIERS: DIAGONAL CUTTING AND END CUTTING

1 SCOPE

This Standard provides performance and safety requirements for pliers suitable for cutting wire. Pliers shall have cutting edges diagonal to or at right angles to their longitudinal axis. Inclusion of dimensional data in this Standard does not mean that all products described herein are stock production sizes, nor that all production sizes are listed. Consumers should 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 manufacture the tools covered.

2 DEFINITIONS

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

3 REFERENCE

The following publication is referenced in this Standard. The latest edition shall be used.

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

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

4 CLASSIFICATIONS

Type I: diagonal cutting, regular nose
Class 1: standard cutting edges
Class 2: semiflush cutting edges
Class 3: flush cutting edges

Type II: regular nose, compound action
Class 1: standard cutting edges
Class 2: semiflush cutting edges
Class 3: flush cutting edges

Type III: discontinued (designation retained for continuity with B107.11-2002)

Type IV: end cutting
Class 1: standard cutting edges
Class 2: semiflush cutting edges
Class 3: flush cutting edges

5 PERFORMANCE REQUIREMENTS

The illustrations shown herein are descriptive and not restrictive, and are not intended to preclude the manufacture of pliers that otherwise comply with this Standard. All figures are shown without comfort grips. Pliers shall withstand applicable tests without cracking or breaking.

5.1 Design

Pliers shall be similar to the figure to which reference is made and shall be proportioned in all parts so as to be strong, durable, and easy to operate. Cutting edges shall be designed to produce one of the severed wire profiles illustrated in Fig. 1.

5.1.1 Type I, Diagonal Cutting, Regular Nose. One side of the jaws shall be recessed to provide a suitable cutting edge clearance. Pliers shall be similar to Fig. 2, 3, 4, or 5 and shall conform to dimensions shown in Table 1 for the size specified. Type I pliers may have stripping notches (a W-shaped notch on the outside of each jaw) and/or a skinning hole (0.052 in. ± 0.005-in. diameter hole in the cutting edges for stripping insulation from wire) as shown in Fig. 4. Type I pliers may also have a cushion grip throat similar to that shown in Fig. 5.

5.1.2 Type II, Regular Nose, Compound Action. Pliers shall be of a compound leverage construction with spring-operated, self-opening handles. Pliers shall be similar to Fig. 6 and conform to the dimensions shown in Table 1 for the size specified.

5.1.3 Type IV, End Cutting. The cutting edges shall be at right angles to the plane of the handles. Pliers shall be similar to Fig. 7 and shall conform to dimensions shown in Table 1 for the size specified.

5.2 Materials

The materials used in the manufacture of pliers shall be such as to produce pliers conforming to this Standard.

5.3 Handles

5.3.1 Characteristics. Handles shall be shaped to provide a comfortable grip and shall be free from rough edges and sharp corners. Ends of handles shall not touch when the jaws are in a closed position. Outer hand gripping surfaces shall be smooth, knurled, impressed, or furnished with comfort grips.

标准分享网 www.bzfxw.com 免费下载

5.3.2 Permanent Set. Permanent set of the handles for all types, except Type II, shall not exceed 0.04 in. when subjected to the handle load test specified in para. 6.3. Handles contacting each other during load testing shall constitute failure.

5.3.3 Comfort Grips. When comfort grips are furnished on handles, they shall be made of rubber, plastic, or other suitable material capable of withstanding normal use without deteriorating or rubbing off and shall pass the solvent resistance test specified in para. 6.4. Comfort grips shall remain permanently attached under normal use.

Unless specifically designed, labeled, and tested for such use, tools with comfort grips shall not be advertised or marked as having any nonconductive or electrically insulating properties.

5.3.4 Hardness. Handles shall have a hardness from 35 HRC to 50 HRC or equivalent.

5.4 Joint

5.4.1 Construction. There shall be no excessive sideways movement, play, or other indication of looseness when pliers are opened or closed that will affect their function.

5.4.2 Fastener Hardness. The fastener hardness shall be from 25 HRC to 50 HRC except when the fastener receives a case-hardening treatment in addition to the through hardening, in which case a maximum hardness equivalent to 60 HRC shall be permitted.

5.5 Jaws

5.5.1 Jaw Opening. Jaw opening shall be measured at the tips of the jaws. Jaws shall open in a smooth and uniform manner to their respective minimum jaw opening as specified in Table 1 for individual type and class of pliers using the procedure specified in para. 6.5. Beyond minimum opening, jaws may open with increasing loads until the positive stop of the tool is engaged.

5.5.2 Cutting Edge Hardness. Cutting edge hardness shall be 55 HRC to 65 HRC or equivalent. The balance of the jaw area shall have a minimum hardness of 35 HRC.

5.5.3 Cushion Grip Throat. The cushion grip throat shall grip and retain the cut wire end. It shall be made of rubber, plastic, or other suitable material capable of withstanding normal use without deteriorating or rubbing off and shall pass the solvent resistance test specified in para. 6.4. Cushion grip throat shall remain permanently attached under normal use.

5.6 Springs

When a spring (or springs) is furnished, it shall be captive, durable, and capable of opening the jaws under normal use. The spring shall open the jaws to minimum jaw opening as specified in Table 1.

5.7 Finish

Metallic surfaces shall have a rust preventive treatment and be free from pits, nodules, burrs, cracks, and other conditions that adversely affect the performance or safety of the pliers. When provided, coatings shall be adherent and free from any condition that interferes with their protective value, safety, and function.

5.8 Marking

Pliers shall be marked in a plain and permanent manner with the manufacturer's name or trademark of such known character that the manufacturer can 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 normally experienced during its intended use.

6 TESTS

WARNING: Many tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be employed in conducting these tests. These tests are designed to evaluate the tools and materials and do not condone the use of the tools in an environment, or in a manner, inconsistent with safe use of the tools.

6.1 Cut Tests

Cut tests shall be performed per ASME B107.25. Wire diameter and handle load are shown in Table 2 herein. Loads are maximum values for these tests. Load shall be applied at the point of maximum handle curvature (normal gripping position).

6.1.1 Paper Cut Test. Prior to the steel wire cut test, the paper cut test shall be performed per ASME B107.25.

6.1.2 Steel Wire. Steel wire for cut tests shall be uncoated single-stranded having minimum tensile strength of 180,000 psi for Class 1, 90,000 psi for Class 2, and 70,000 psi for Class 3.

6.1.3 Steel Wire Cut Test for Types I and II. Three cuts shall be made at the joint end of the cutting edges, and the load required to completely sever the wire shall not exceed the maximum handle load specified in Table 2. Three cuts shall be made midpoint and opposite the joint end. Load determinations shall not be required for cuts made at locations other than the joint end of cutters. A total of nine cuts shall be made.

6.1.4 Steel Wire Cut Test for Type IV. A total of nine cuts shall be made. Three cuts shall be made at the approximate midpoint of the cutting edges, and the test load required to completely sever the wire shall not

exceed the maximum handle load specified in Table 2 herein. Three cuts shall be made at each end of the cutting edges with the wire located not more than 0.13 in. from the respective ends. Load determinations shall not be required for cuts made at the ends of the cutting edges.

6.1.5 Paper Cut Test. Following steel wire cut test, the paper cut test shall be performed per ASME B107.25. Cutting performance shall be comparable with the first paper cut test results.

6.2 Hardness Test

Hardnesses specified herein shall be tested per ASME B107.25. Handle hardness determination shall be taken approximately midway between the fastener and the end of each handle.

6.3 Handle Load Test

Tests shall be conducted per ASME B107.25. Loads are specified in Table 2 herein and are minimum values for this test. Load shall be applied at the point of maximum handle curvature (normal gripping position). Grips, when provided, shall be removed prior to testing.

6.4 Solvent Resistance Test

Comfort grips and cushion grip throat shall be tested per ASME B107.25.

6.5 Jaw Opening and Closing Test

Pliers shall be tested per ASME B107.25. The load required to open jaws to, or close jaws from, the respective minimum jaw opening shall not be greater than that shown in Table 2 herein. Minimum jaw openings are specified in Table 1 herein.

6.6 Joint Integrity Test

Pliers shall be tested in accordance with ASME B107.25 using a minimum of 1.5 lbf. Maximum allowable play shall be 0.01 in. per inch of handle length measured from the pivot to the end of the handle.

7 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

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

标准分享网 www.bzfxw.com 免费下载

Fig. 1 Typical Profiles of Severed Copper Wire With Corresponding Cutting Edge Cross Sections

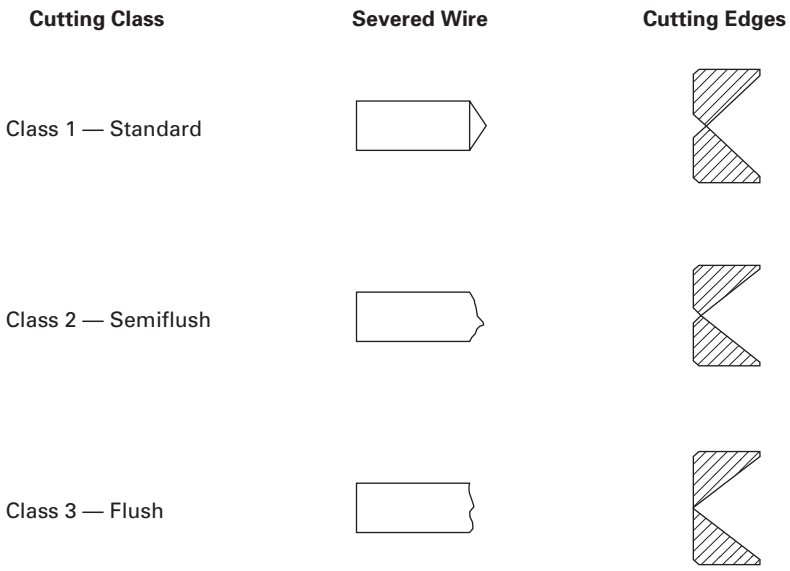


Fig. 2 Type I, Diagonal Cutting, Regular Nose, Plain

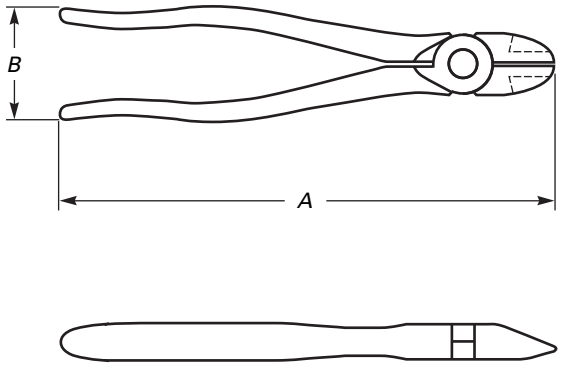


Fig. 3 Type I, Alternate Design

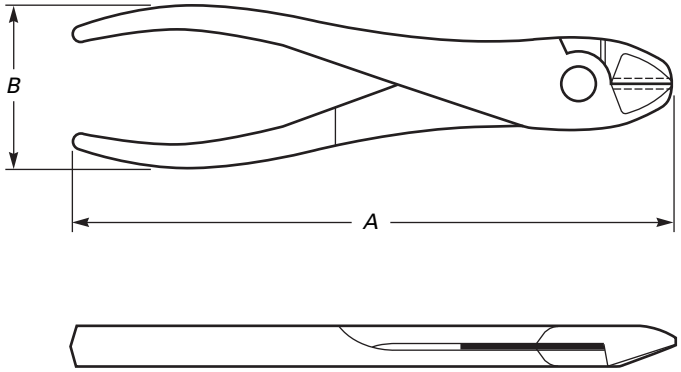


Fig. 4 Type I, Alternate Design With Stripping Notches and Skinning Hole

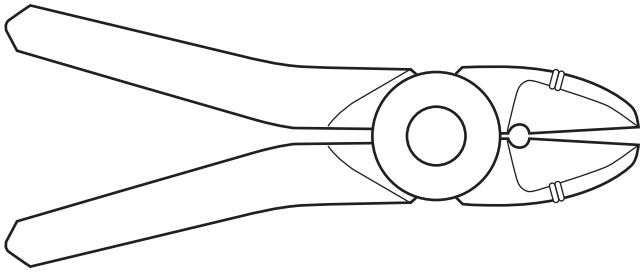
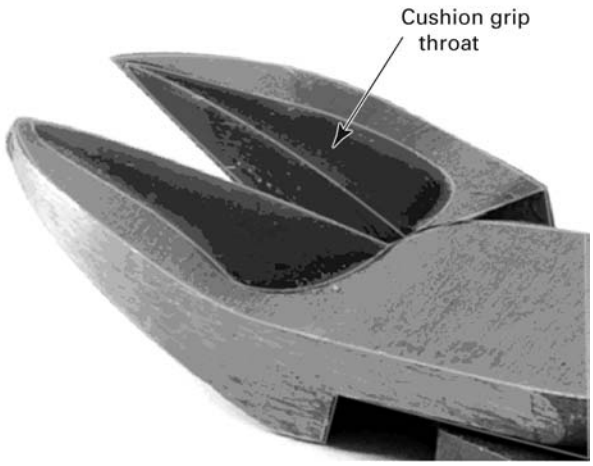


Fig. 5 Type I, Alternate Design With Cushion Grip Throat



标准分享网 www.bzfxw.com 免费下载

Fig. 6 Type II, Regular Nose, Compound Action

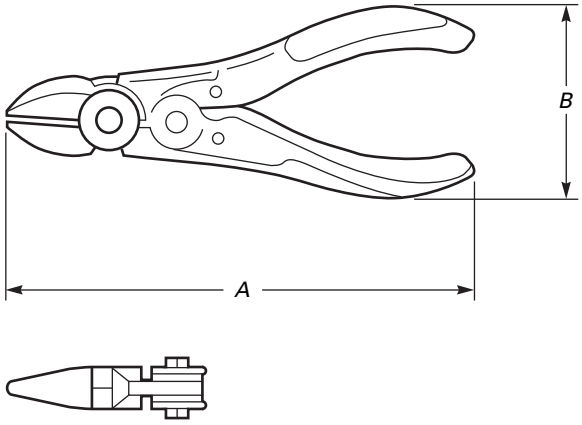


Fig. 7 Type IV, End Cutting

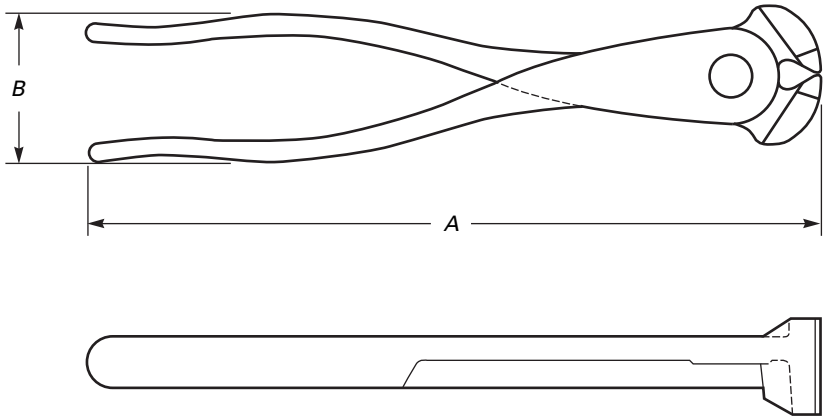


Table 1 Dimensional Requirements

Type	Nominal Size, in.	Overall Length, *A*, in. [Note (1)]		Handle Span, *B*, in. [Note (1)]		Minimum Jaw Opening, in.
		Min.	Max.	Min.	Max.	
I	4	3.87	4.25	1.65	2.00	0.19
I	4½	4.25	4.69	1.65	2.13	0.25
I	5	4.87	5.25	1.65	2.13	0.31
I	6	5.50	6.50	1.65	2.25	0.44
I	7	6.62	7.81	1.65	2.25	0.50
I	8	7.50	8.50	1.65	2.25	0.50
I	11	10.50	11.50	1.75	2.25	0.50
II	5½	5.25	5.75	1.69	2.25	0.19
IV	4½	3.87	5.00	1.31	1.94	0.12
IV	6	5.75	6.75	1.44	2.06	0.19
IV	7	6.75	7.75	1.56	2.19	0.25
IV	8	7.75	8.75	1.56	2.19	0.25

NOTE
(1) For plain handles without comfort grips.

Table 2 Jaw Opening, Wire Cut, and Permanent Set Test Parameters

Nominal Cutter Size, in.	Maximum Jaw Opening Handle Force, lbf	Class 1		Classes 2 and 3	
		Wire Diameter, in.	Major Handle Load, lbf-in.	Wire Diameter, in.	Major Handle Load, lbf-in.
4	0.75	0.032/0.036	100	0.032/0.036	50
4½	0.75	0.045/0.049	265	0.032/0.036	133
5	1.5	0.060/0.064	500	0.032/0.036	250
5½	1.5	0.060/0.064	600	0.032/0.036	300
6	2.25	0.078/0.082	700	0.032/0.036	350
7	2.25	0.078/0.082	750	0.032/0.036	375
8	2.25	0.078/0.082	775	0.032/0.036	388
11	2.25	0.078/0.082	775	0.032/0.036	388

标准分享网 www.bzfxw.com 免费下载

ASME B107.13

PLIERS: LONG NOSE, LONG REACH

1 SCOPE

This Standard provides performance and safety requirements for long nose, long reach pliers. Inclusion of dimensional and functional data in this Standard does not mean that all products described herein are stock production sizes, nor that all production sizes are listed. Consumers should consult with manufacturers concerning lists of stock production sizes.

This Standard may be used as a guide by state authorities and 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 DEFINITIONS

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

3 REFERENCE

The following publication is referenced in this Standard. The latest edition shall be used.

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

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

4 CLASSIFICATIONS

Type I: flat nose/duck bill
- *Class 1:* narrow nose
- *Class 2:* medium nose
- *Class 3:* wide nose
  - Style A: without cutter
  - Style B: with cutter
- *Class 4:* long reach, flat nose

Type II: double round nose

Type III: round nose
- *Class 1:* long nose
  - Style A: without cutter
  - Style B: with cutter
- *Class 2:* bent nose
- *Class 3:* short nose
  - Style A: without cutter
  - Style B: with cutter
- *Class 4:* needle nose
  - Style A: without cutter
  - Style B: with cutter

5 PERFORMANCE REQUIREMENTS

The illustrations shown herein are descriptive, not restrictive, and are not intended to preclude the manufacture of pliers that are otherwise in accordance with this Standard. All figures are shown without comfort grips.

5.1 Design

Pliers shall be similar to those depicted in the referenced figures and shall be proportioned in all parts to be strong, durable, and easy to operate. Pliers shall withstand applicable tests without cracking or breaking.

5.1.1 Type I — Flat Nose/Duck Bill. The jaws of Type I pliers shall taper as specified in the tables. The jaws shall contact each other at the outermost end when the pliers are in a closed position.

5.1.1.1 Class 1 — Narrow Nose. Class 1 pliers shall taper uniformly in thickness and in width from near the joint to the outermost end. Scoring on jaw gripping surfaces shall begin at the jaw tips and extend 25% to 33% of jaw length. The pliers shall conform to the requirements shown in Table 1 for the size specified and shall be similar to those shown in Fig. 1.

5.1.1.2 Class 2 — Medium Nose. The width of the jaws shall be uniform throughout and shall taper in thickness from near the joint to the outermost end. Scoring on jaw gripping surfaces shall begin at the jaw tips and extend 25% to 33% of jaw length. The pliers shall conform to the requirements shown in Table 2 for the size specified and shall be similar to the illustration shown in Fig. 2.

5.1.1.3 Class 3 — Wide Nose. The gripping jaws shall be of uniform width and shall taper in thickness from near the joint to the outermost end. Scoring on jaw gripping surfaces shall begin at the jaw tips and extend 25% to 33% of jaw length.

标准分享网 www.bzfxw.com 免费下载

(a) Style A. Style A pliers (without cutter) shall conform to the requirements shown in Table 3 and shall be similar to the illustration shown in Fig. 3.

(b) Style B. Style B pliers (with cutter) shall conform to the requirements of para. 5.1.1.3(a) except that the jaws have cutting edges on one side near the joint end.

5.1.1.4 Class 4 — Long Reach, Flat Nose. The jaws of Class 4 pliers shall taper uniformly in thickness and width from near the joint to the outermost end. The gripping surfaces of the jaws shall be scored. The length of the scoring shall be at least 0.5 in. back from the outermost end. The pliers shall conform to the requirements shown in Table 4 and shall be similar to the illustration shown in Fig. 4.

5.1.2 Type II — Double Round Nose. Type II pliers shall be suitable for bending and shaping wire. The jaws shall be round in cross section so that the gripping surfaces are circular. The jaws shall taper uniformly from near the joint to the outermost end. With the pliers in a closed position, the jaws shall contact each other only at the outermost end. With the jaws parallel to each other, the distance between jaws shall be not less than 0.03 in. The pliers shall conform to the requirements shown in Table 5 for the size specified and shall be similar to the illustration shown in Fig. 5.

5.1.3 Type III — Round Nose. The jaws of Type III pliers shall be suitable for forming wire loops, handling small objects, and reaching into small openings. Each jaw shall be of half-round cross section so that the gripping surfaces are planar and straight. The jaws shall taper uniformly from near the joint section to the outermost end. Scoring on jaw gripping surfaces shall begin at the jaw tips and extend 25% to 33% of jaw length. The jaws shall contact each other at the outermost end when the pliers are in the closed position. If the nose design is elliptical, use dimensions *F* and *G*. If the nose design is circular, use dimension *F* only.

5.1.3.1 Class 1 — Long Nose

(a) Style A. Style A pliers (without cutter) shall conform to the requirements shown in Table 6 for the size specified and shall be similar to the illustration shown in Fig. 6.

(b) Style B. The jaws of Style B pliers (with cutter) shall be provided with cutting edges on one side adjacent to the joint. With the pliers in the closed position, the cutting edges shall contact each other throughout the entire length. The pliers shall conform to the requirements shown in Table 6 for the size specified and shall be similar to the illustration shown in Fig. 7.

5.1.3.2 Class 2 — Bent Nose. The jaws of Class 2 pliers shall be of half-round cross section so that the gripping surfaces are planar. The jaws shall be curved and shall taper from near the joint section or the bend to the outermost end. The pliers shall conform to the requirements shown in Table 7 for the size specified and shall be similar to the illustration shown in Fig. 8.

5.1.3.3 Class 3 — Short Nose. The jaws of Class 3 pliers shall be suitable for forming wire loops, handling small objects, and reaching into small openings. Each jaw shall be of half-round cross section so that the gripping surfaces are planar and straight. The jaws shall taper uniformly from near the joint section to the outermost end.

(a) Style A. Style A pliers (without cutter) shall conform to the requirements shown in Table 8 for the size specified and shall be similar to the illustration shown in Fig. 9 or Fig. 10.

(b) Style B. The jaws of Style B pliers (with cutter) shall be provided with cutting edges on one side adjacent to the joint. The pliers shall conform to the requirements shown in Table 8 for the size specified and shall be similar to the illustration shown in Fig. 11.

5.1.3.4 Class 4 — Needle Nose

(a) Style A. The jaws of Style A pliers (without cutter) shall be straight and shall taper from near the joint section to the outermost end. The pliers shall conform to the requirements shown in Table 9 and shall be similar to the illustration shown in Fig. 12.

(b) Style B. Style B pliers (with cutter) shall conform to the requirements of para. 5.1.3.4(a) except that the jaws shall be provided with cutting edges on one side adjacent to the joint.

5.2 Materials

The materials used in the manufacture of the pliers shall be such as to produce pliers conforming to this Standard.

5.3 Cutting Edges

Pliers with cutting edges shall pass the tests in para. 6.1.

5.4 Handles

5.4.1 Characteristics. Handles shall be shaped to afford a comfortable grip and shall be free from rough edges and sharp corners to prevent injury to the hand. Handles shall have a hardness from 35 HRC to 50 HRC or equivalent. Ends of handles shall not touch when the jaws are in a closed position. Hand gripping surfaces shall be smooth, knurled, impressed, or furnished with comfort grips.

5.4.2 Set. Permanent set of the handles for all types shall not exceed 0.04 in. when subjected to the handle load test specified in para. 6.3.

5.4.3 Comfort Grips. When comfort grips are furnished on handles, they shall be made of rubber, plastic, or other suitable material capable of withstanding long, hard usage without deteriorating or rubbing off and

shall pass the solvent test specified in para. 6.4. The comfort grips shall remain permanently attached under normal use of the tool. Unless specifically designed, labeled, and tested for such use, tools with comfort grips shall not be advertised or marked as having any nonconductive or electrically insulative properties.

5.5 Joints

Joints shall pass the test specified in para. 6.6. Fastener hardness shall be from 25 HRC to 50 HRC except when the fastener receives a case-hardening treatment in addition to the through hardening, a maximum hardness equivalent to 60 HRC shall be permitted.

5.6 Jaws

5.6.1 Jaw Openings. The ends of the jaws shall open to the respective minimum distance as specified for the individual types and classes of pliers. Pliers shall pass the test in para. 6.5. Beyond the minimum opening distance specified, the jaws may open at increased loads until the positive stop of the tool is engaged.

5.6.2 Cutting Edge Hardness. Cutting edges shall have a hardness of 55 HRC to 65 HRC or equivalent. The balance of the jaw area shall have a minimum hardness of 35 HRC.

5.6.3 Scored Surfaces. Scored surfaces, where specified for gripping jaws, shall have visually sharp projections and be uniform in appearance.

5.7 Springs

When a spring (or springs) is furnished, it shall be capable of opening the pliers' jaws to the minimum distance specified in the tables for the individual type and class of pliers.

5.8 Finish

Metallic surfaces shall have a rust preventive treatment and be free from pits, nodules, burrs, cracks, and other conditions that adversely affect the performance or safety of the pliers. When provided, coatings shall be adherent and free from any condition that interferes with their protective value, safety, and function.

5.9 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 manufacturer shall be readily determined. The marking shall be as permanent as the normal life expectancy of the pliers to which it is applied (providing the surface to which it was applied has not been subjected to a fretting or abrading action) and be capable of withstanding the cleaning procedures normally experienced during its intended use.

6 TESTS

WARNING: Many of the tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be employed in conducting these tests. These tests are designed to evaluate the tools and materials and do not condone the use of the tools in an environment, or in a manner, inconsistent with safe use of the tools.

6.1 Cut Test

Cut tests shall be performed in accordance with ASME B107.25.

6.1.1 Paper Cut Test. Prior to the wire cut test, the paper cut test shall be performed.

6.1.2 Steel Wire Cut Test. Steel wire for cut tests shall be 0.060-in. to 0.064-in. diameter uncoated, single-strand wire having a minimum tensile strength of 180,000 psi. Three cuts shall be made at the joint end of the cutting edges using a load to create a moment not to exceed 300 lbf-in. Three cuts shall be made at the midpoint and opposite the joint end. Load determinations shall not be required for cuts made at locations other than the joint end of the cutters. A total of nine cuts shall be made. The pliers shall completely sever the wire each cut.

6.1.3 Paper Cut Test. Following the wire cut test, the paper cut test shall be performed. Cutting performance shall be comparable with the previous paper cut test results.

6.2 Hardness Test

Hardness values specified herein shall be tested in accordance with ASME B107.25.

6.3 Handle Load Test

Permanent set shall be tested in accordance with ASME B107.25. Loads are specified in the applicable tables herein. Loads shall be applied at the point of maximum handle curvature (normal gripping position). Comfort grips, when provided, shall be removed prior to testing. If necessary, a piece of flat stock at a minimum hardness of 40 HRC may be inserted between the jaws to prevent handles from contacting each other during the test.

6.4 Comfort Grip Solvent Test

Comfort grips shall be tested in accordance with ASME B107.25.

6.5 Jaw Opening Test

Pliers shall be tested in accordance with ASME B107.25. The force required to open the jaws of the pliers to their respective minimum distance specified in the tables for the individual types, classes, and sizes shall not be greater than that shown in Table 10.

标准分享网 www.bzfxw.com 免费下载

6.6 Joint Integrity Test

Pliers shall be tested in accordance with ASME B107.25 using a minimum of 1.5 lbf. Maximum allowable play shall be 0.01 in. per inch of handle length measured from the pivot to the end of the handle.

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*.

Fig. 1 Type I, Class 1, Flat Nose/Duck Bill, Narrow Nose

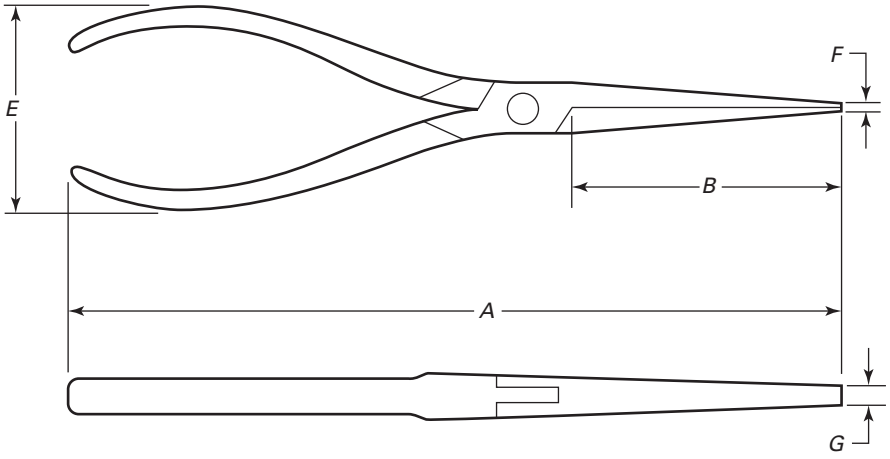


Fig. 2 Type I, Class 2, Flat Nose/Duck Bill, Medium Nose

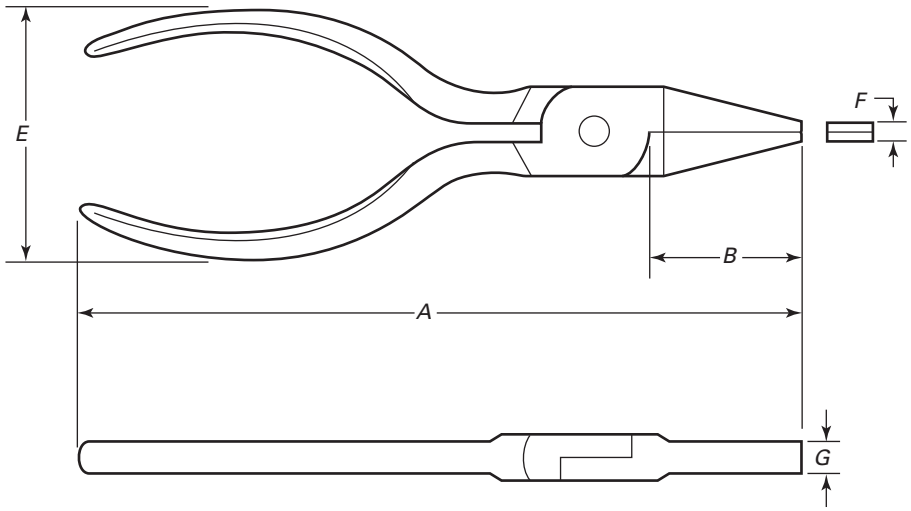


Fig. 3 Type I, Class 3, Style A, Flat Nose/Duck Bill, Wide Nose, Without Cutter

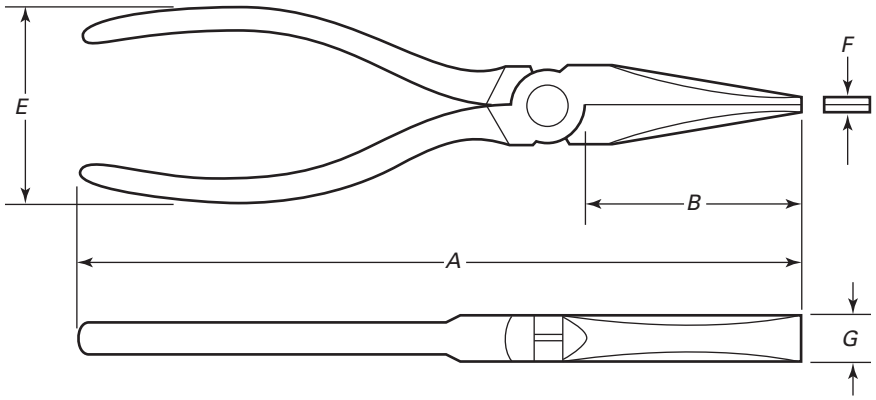
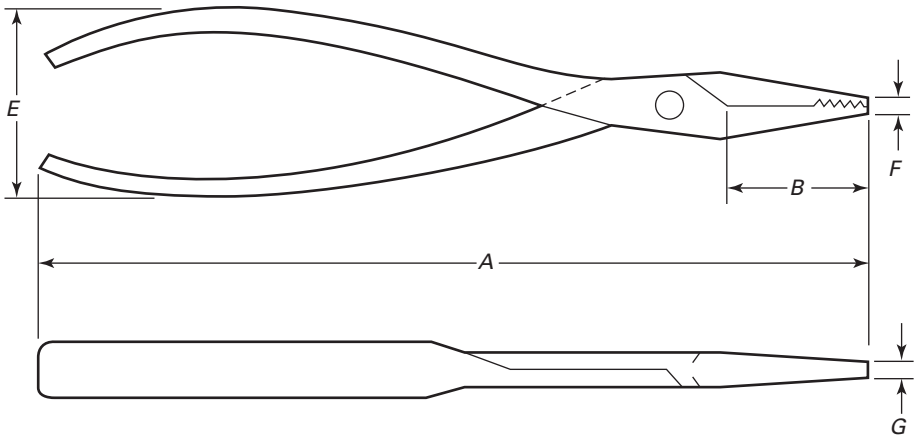


Fig. 4 Type I, Class 4, Flat Nose/Duck Bill, Long Reach, Flat Nose



标准分享网 www.bzfxw.com 免费下载

Fig. 5 Type II, Double Round Nose

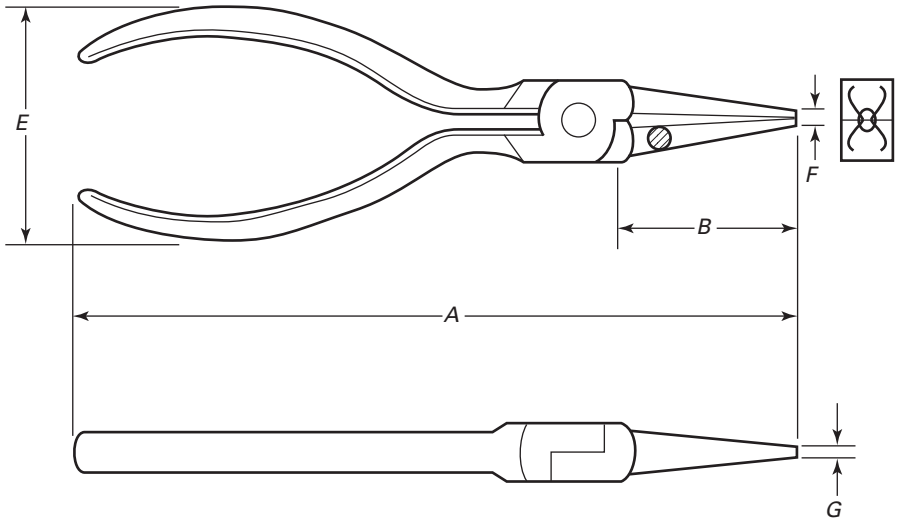


Fig. 6 Type III, Class 1, Style A, Round Nose, Long Nose, Without Cutter

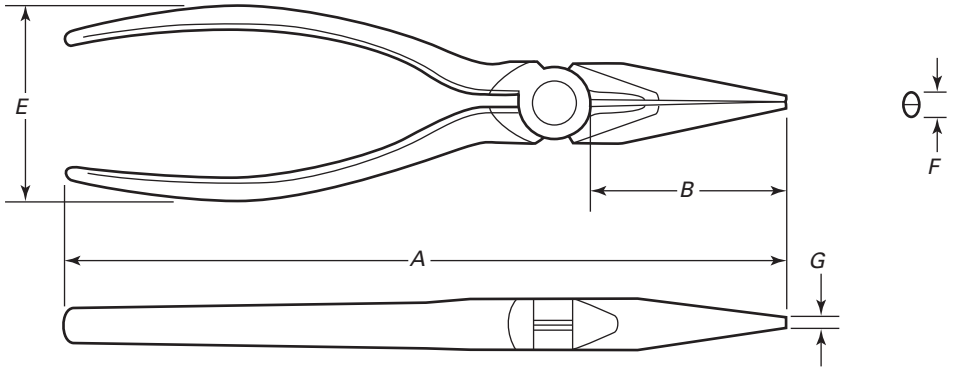


Fig. 7 Type III, Class 1, Style B, Round Nose, Long Nose, With Cutter

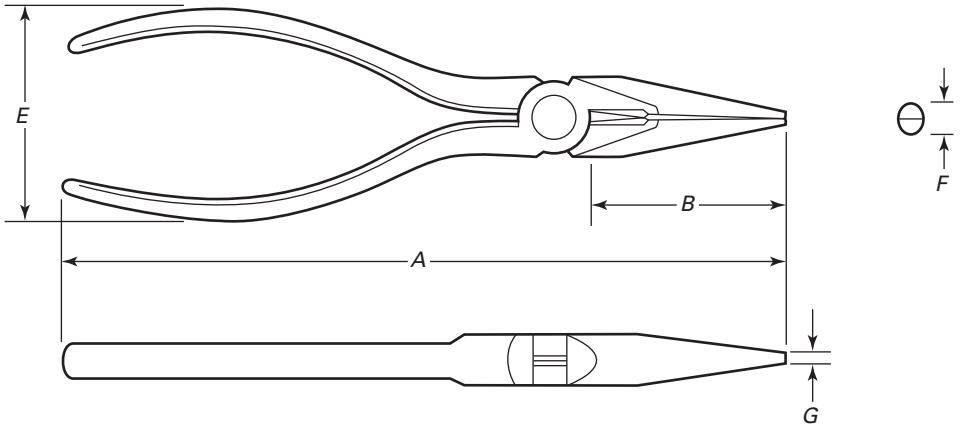
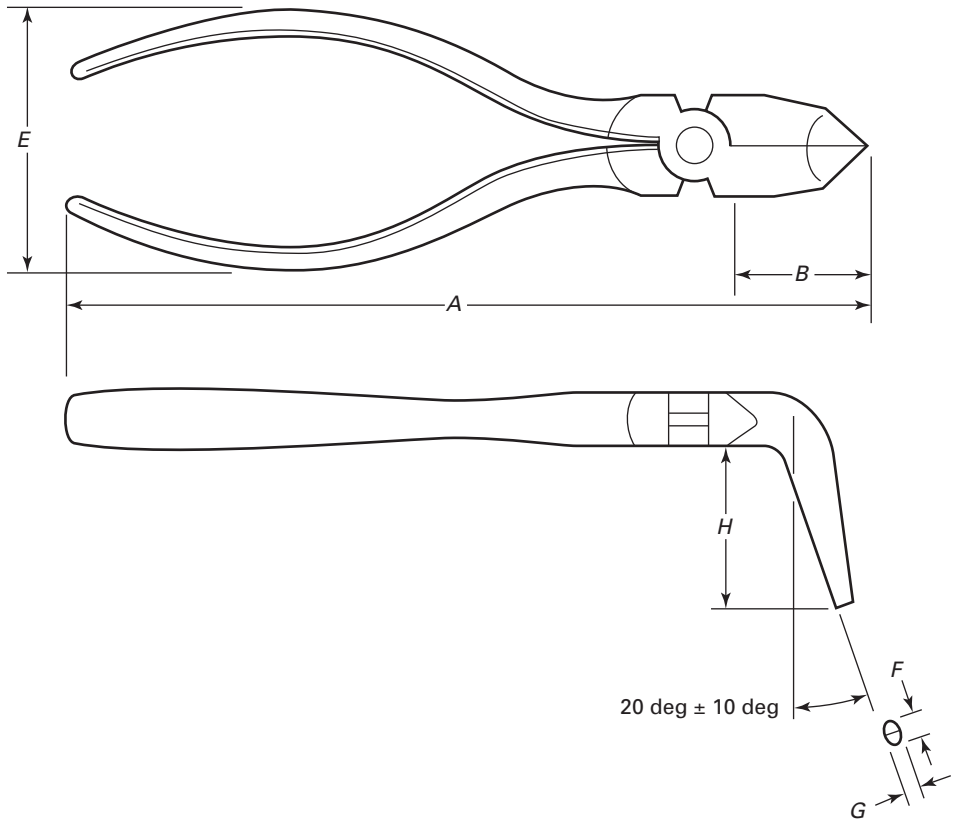


Fig. 8 Type III, Class 2, Round Nose, Bent Nose



标准分享网 www.bzfxw.com 免费下载

Fig. 9 Type III, Class 3, Style A, Round Nose, Short Nose, Without Cutter

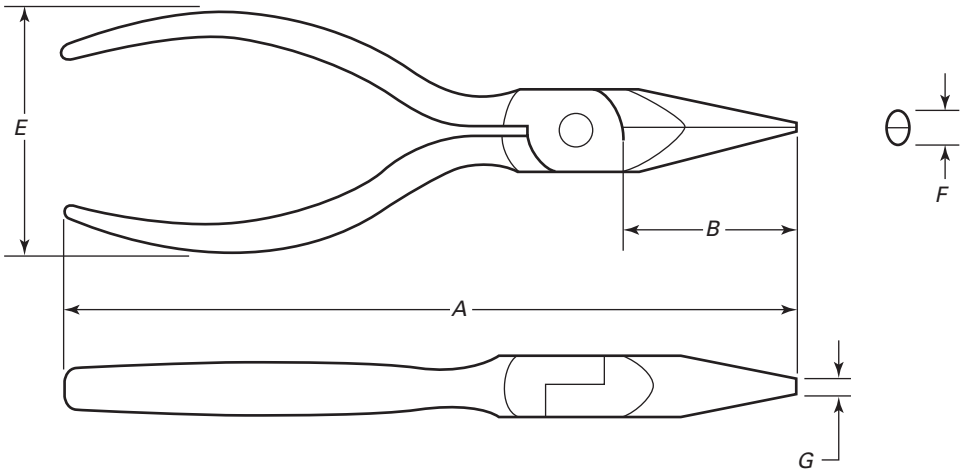


Fig. 10 Type III, Class 3, Style A, Round Nose, Short Nose, Without Cutter (Optional Design)

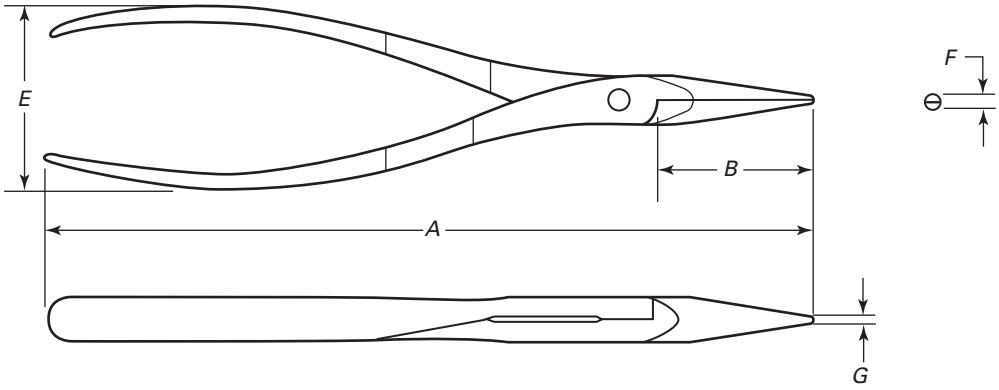


Fig. 11 Type III, Class 3, Style B, Round Nose, Short Nose, With Cutter

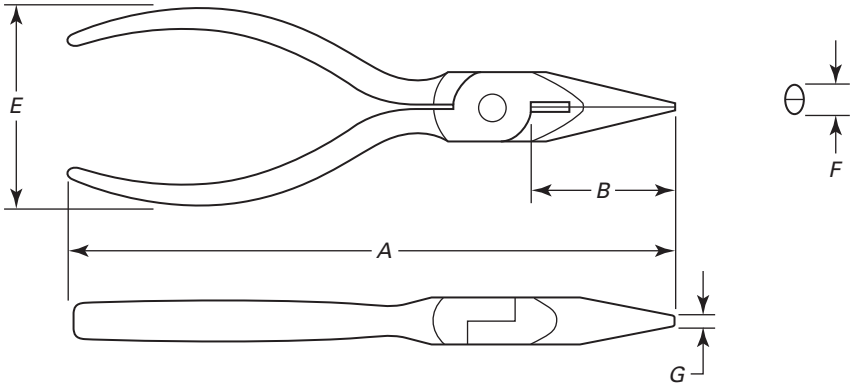


Fig. 12 Type III, Class 4, Style A, Round Nose, Needle Nose, Without Cutter

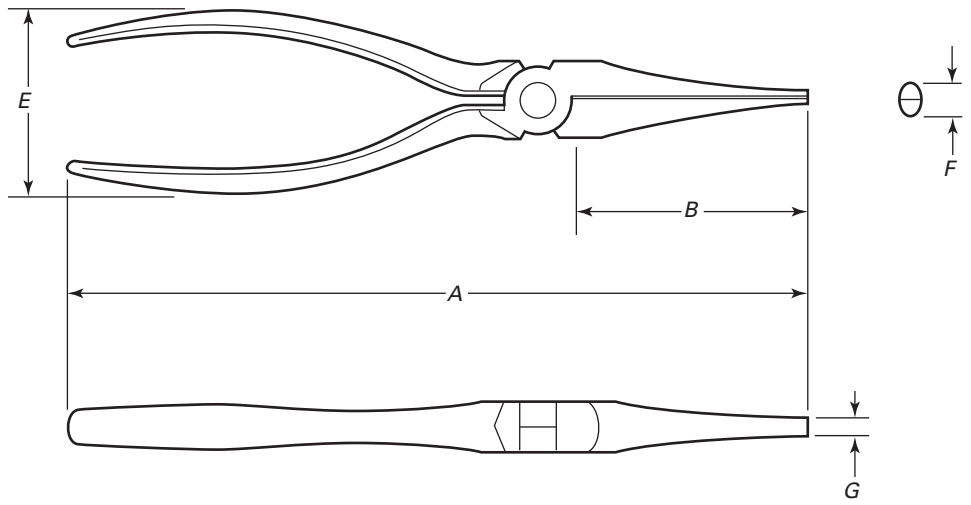


Table 1 Type I, Class 1, Flat Nose/Duck Bill, Narrow Nose

Nominal Size, in.	Overall Length, *A*, in. [Note (1)]		Jaw Length, *B*, in.		Handle Span, *E*, in. [Note (1)]		Nose Tip Thickness, *F*, in.		Nose Tip Width, *G*, in.		Minimum Jaw Opening, in.	Minimum Handle Moment, lbf-in.
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
4½	4.69	4.94	1.06	1.19	1.63	2.13	0.03	0.06	0.13	0.19	0.63	100
5	5.31	5.69	1.63	1.88	1.63	2.13	0.03	0.06	0.09	0.16	0.63	200
7	7.25	7.75	2.25	2.75	1.63	2.13	0.02	0.08	0.13	0.38	1.00	300

NOTE:
(1) "*A*" and "*E*" dimensions in this table are without comfort grips.

Table 2 Type I, Class 2, Flat Nose/Duck Bill, Medium Nose

Nominal Size, in.	Overall Length, *A*, in. [Note (1)]		Jaw Length, *B*, in.		Handle Span, *E*, in. [Note (1)]		Nose Tip Thickness, *F*, in.		Nose Tip Width, *G*, in.		Minimum Jaw Opening, in.	Minimum Handle Moment, lbf-in.
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
4	4.38	4.88	0.75	1.25	1.69	2.19	0.03	0.13	0.06	0.19	0.38	100
5	5.00	5.50	1.13	1.63	1.50	2.00	0.08	0.19	0.28	0.41	0.50	200
6	6.00	6.50	1.25	1.75	1.75	2.25	0.08	0.19	0.28	0.41	0.63	300
7½	7.50	8.00	1.25	1.75	1.63	2.25	0.08	0.19	0.25	0.38	0.69	300

NOTE:
(1) "*A*" and "*E*" dimensions in this table are without comfort grips.

标准分享网 www.bzfxw.com 免费下载

Table 3 Type I, Class 3, Flat Nose/Duck Bill, Wide Nose

Nominal Size, in.	Overall Length, *A*, in. [Note (1)]		Jaw Length, *B*, in.		Handle Span, *E*, in. [Note (1)]		Nose Tip Thickness, *F*, in.		Nose Tip Width, *G*, in.		Minimum Jaw Opening, in.	Minimum Handle Moment, lbf-in.
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
4	3.75	4.75	0.75	1.25	1.63	2.13	0.03	0.09	0.22	0.28	0.38	100
6	6.00	7.00	2.00	2.50	1.63	2.13	0.06	0.13	0.31	0.44	0.75	300

NOTE:
(1) "*A*" and "*E*" dimensions in this table are without comfort grips.

Table 4 Type I, Class 4, Flat Nose/Duck Bill, Long Reach, Flat Nose

Nominal Size, in.	Overall Length, *A*, in. [Note (1)]		Jaw Length, *B*, in.		Handle Span, *E*, in. [Note (1)]		Nose Tip Thickness, *F*, in.		Nose Tip Width, *G*, in.		Minimum Jaw Opening, in.	Minimum Handle Moment, lbf-in.
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
8	7.50	8.50	1.19	1.69	1.63	2.25	0.08	0.17	0.25	0.38	1.50	300

NOTE:
(1) "*A*" and "*E*" dimensions in this table are without comfort grips.

Table 5 Type II, Double Round Nose

Nominal Size, in.	Overall Length, *A*, in. [Note (1)]		Jaw Length, *B*, in.		Handle Span, *E*, in. [Note (1)]		Nose Tip Thickness, *F*, in.		Nose Tip Width, *G*, in.		Minimum Jaw Opening, in.	Minimum Handle Moment, lbf-in.
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
4½	4.25	4.75	0.63	0.88	1.75	2.00	0.09	0.16	0.05	0.08	0.38	100
6	5.75	6.75	1.13	1.63	1.63	2.13	0.13	0.25	0.06	0.13	0.63	300

NOTE:
(1) "*A*" and "*E*" dimensions in this table are without comfort grips.

Table 6 Type III, Class 1, Round Nose, Long Nose

Nominal Size, in.	Overall Length, *A*, in. [Note (1)]		Jaw Length, *B*, in.		Handle Span, *E*, in. [Note (1)]		Nose Tip Thickness, *F*, in.		Nose Tip Width, *G*, in.		Minimum Jaw Opening, in.	Minimum Handle Moment, lbf-in.
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
4½	4.69	4.94	1.06	1.19	1.75	2.00	0.05	0.09	0.04	0.08	0.75	100
5	5.38	5.75	1.44	1.69	1.63	2.13	0.05	0.16	0.04	0.16	0.75	200
6	5.90	6.75	1.67	2.25	1.63	2.32	0.05	0.16	0.04	0.13	1.00	300
7	6.80	8.00	2.19	2.81	1.63	2.53	0.06	0.20	0.06	0.13	1.13	300
8	7.81	8.81	1.90	3.30	1.63	2.53	0.08	0.20	0.08	0.16	1.13	300

NOTE:
(1) "*A*" and "*E*" dimensions in this table are without comfort grips.

Table 7 Type III, Class 2, Round Nose, Bent Nose

Nominal Size, in.	Overall Length, *A*, in. [Note (1)]		Jaw Length, *B*, in.		Handle Span, *E*, in. [Note (1)]		Nose Tip Thickness, *F*, in.		Nose Tip Width, *G*, in.		Bent Nose Length, *H*, in.		Minimum Jaw Opening, in.	Minimum Handle Moment, lbf-in.
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
4 1/2	4.00	5.00	0.50	1.00	1.75	2.00	0.09	0.16	0.06	0.13	0.38	0.63	0.50	100
6	5.50	7.40	1.25	1.90	1.63	2.53	0.08	0.20	0.06	0.13	0.63	2.40	0.50	300

NOTE:
(1) "*A*" and "*E*" dimensions in this table are without comfort grips.

Table 8 Type III, Class 3, Round Nose, Short Nose

Nominal Size, in.	Overall Length, *A*, in. [Note (1)]		Jaw Length, *B*, in.		Handle Span, *E*, in. [Note (1)]		Nose Tip Thickness, *F*, in.		Nose Tip Width, *G*, in.		Minimum Jaw Opening, in.	Minimum Handle Moment, lbf-in.
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
4 1/2	4.63	4.88	0.83	1.06	1.63	2.13	0.08	0.11	0.03	0.09	0.38	100
5	4.63	5.44	0.88	1.38	1.63	2.13	0.05	0.13	0.03	0.09	0.38	200
6	6.00	6.75	1.25	1.75	1.63	2.13	0.06	0.13	0.03	0.13	0.63	300
8	7.50	8.00	0.94	1.44	1.63	2.13	0.06	0.13	0.03	0.13	0.75	300

NOTE:
(1) "*A*" and "*E*" dimensions in this table are without comfort grips.

Table 9 Type III, Class 4, Round Nose, Needle Nose

Nominal Size, in.	Overall Length, *A*, in. [Note (1)]		Jaw Length, *B*, in.		Handle Span, *E*, in. [Note (1)]		Nose Tip Thickness, *F*, in.		Nose Tip Width, *G*, in.		Minimum Jaw Opening, in.	Minimum Handle Moment, lbf-in.
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
5	5.22	5.59	1.63	1.88	1.50	2.00	0.05	0.08	0.05	0.08	1.00	200
6 1/2	6.00	7.00	2.06	2.69	1.50	2.25	0.06	0.19	0.02	0.14	1.50	300

NOTE:
(1) "*A*" and "*E*" dimensions in this table are without comfort grips.

Table 10 Jaw Opening Test

Nominal Size, in.	Maximum Force Applied to Handle, lbf
4 to 4 3/4	1
5	2
6	3
7	3
8	3

标准分享网 www.bzfxw.com 免费下载

ASME B107.16

SHEARS (METAL CUTTING, HAND)

1 SCOPE

This Standard provides performance and safety requirements for hand shears generally used for cutting sheet metal. Inclusion of dimensional data in this Standard does not mean that all products described herein are stock production sizes. Consumers should 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 manufacture the tools covered.

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

2 DEFINITIONS

blade pattern: orientation and configuration of the cutting blades.

compound leverage: a system of pivot points that multiply the force applied at the handles and transfer that force to the cutting blades.

full length of cut: maximum distance cut in one operation.

length of cut: the distance cut in one operation.

shearing blades: blades that have a single contact point (with each other) that moves from the joint end of the blade to the tip of the blade as handles close.

3 REFERENCES

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

ASTM A 240/A 240M, Standard Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels

ASTM A 1008/A 1008M, Standard Specifications for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy With Improved Formability

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: The Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591 (www.hti.org)

4 CLASSIFICATIONS

Type I: tinner
- *Class 1:* straight cut
  - Style A: fixed blade
  - Style B: replaceable blade
  - Style C: fixed blade bulldog
- *Class 2:* duckbill (straight and circular cut)

Type II: compound leverage (aviation)
- *Class 1:* straight cutting
  - Style A: regular
  - Style B: bulldog
  - Style C: long cut
- *Class 2:* straight and circular cutting to the right
- *Class 3:* straight and circular cutting to the left
- *Class 4:* offset jaw straight and circular cutting to the right
- *Class 5:* offset jaw straight and circular cutting to the left

5 PERFORMANCE REQUIREMENTS

The illustrations shown herein are descriptive and not restrictive and are not intended to preclude the manufacture of shears that otherwise comply with this Standard.

Shears shall pass applicable tests in section 6 without cracking, breaking, or requiring repair or readjustment to any components during testing.

5.1 Design

Shears shall be designed for hand operation. The cutting edges shall not need to be opened more than 45 deg (included angle) to obtain the length of cut specified (in Table 1 or Table 2) in a single cutting operation. Handle area shall be smoothly finished and shaped to afford comfortable hand and finger gripping surfaces. Shears shall operate smoothly, with blade surfaces and pivots working smoothly and easily (without binding) from fully open to a fully closed position.

5.1.1 Type I, Tinner Shear. Shears shall consist essentially of two shearing blades, two handles, and a fastener. Clearance shall be provided between handles in a closed position to protect an operator's thumb and fingers.

标准分享网 www.bzfxw.com 免费下载

5.1.1.1 Class 1, Straight Cut. Shears shall be straight cut blade pattern shears with bow-shaped handles.

(a) Style A, Fixed Blade. Shears shall be of solid construction with integral blades. Style A shears shall be similar to Fig. 1 and shall comply with Table 1.

(b) Style B, Replaceable Blade. Shears shall be of replaceable blade construction. Style B shears shall be similar to Fig. 2 and shall comply with Table 1.

(c) Style C, Fixed Blade Bulldog. Shears shall perform short cuts in thick material. Shears shall be similar to Fig. 3 and shall comply with Table 1.

5.1.1.2 Class 2, Duckbill. Shears shall be duckbill blade pattern shears made with integral blades and handles and shall be designed for cutting intricate patterns and curves having short radii with a minimum amount of bending of the material being cut. Shears shall have bow-shaped handles, shall be similar to Fig. 4, and shall comply with Table 1.

5.1.2 Type II, Compound Leverage. Shears shall have the same components as Type I, plus a mechanism to compound leverage. The cutting edges at the tips of Type II shears shall not overlap more than 0.09 in. when handles are pressed against their positive stops.

5.1.2.1 Class 1, Straight Cutting. Class 1 shears shall be designed primarily for straight cutting but may be capable of cutting patterns and wide curves. They shall be similar to figures referenced and shall conform to the applicable requirements of Table 2.

(a) Style A shears shall have a regular blade pattern and be similar to Fig. 5.

(b) Style B shears shall have a bulldog blade pattern and be similar to Fig. 6.

(c) Style C shears shall have a long cut blade pattern and be similar to Fig. 7.

5.1.2.2 Class 2, Straight and Circular Cutting to the Right. Class 2 shears shall be designed primarily for making straight and circular cuts to the right, shall be similar to Fig. 8, and shall conform to the applicable requirements of Table 2.

5.1.2.3 Class 3, Straight and Circular Cutting to the Left. Class 3 shears shall be designed primarily for making straight and circular cuts to the left, shall be similar to Fig. 9, and shall conform to the applicable requirements of Table 2.

5.1.2.4 Class 4, Offset Jaw Straight and Circular Cutting to the Right. Class 4 shears shall be designed primarily for making straight and tight circular cuts to the right while flowing material away from the shearing blades and raising the user's hand above the working surface. Shears shall be similar to Fig. 10 and shall conform to the applicable requirements of Table 2.

5.1.2.5 Class 5, Offset Jaw Straight and Circular Cutting to the Left. Class 5 shears shall be designed primarily for making straight and tight circular cuts to the left while flowing material away from the shearing blades and raising the user's hand above the working surface. Shears shall be similar to Fig. 11 and shall conform to the applicable requirements of Table 2.

5.2 Materials

The materials used in the manufacture of the shears shall be such as to produce shears conforming to this Standard.

5.3 Marking

Shears shall be marked in a plain and permanent manner with the manufacturer's name or with a trademark of such known character that the manufacturer can be readily determined. Marking shall be as permanent as the normal life expectancy of the shears 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.

5.4 Finish

Metallic surfaces shall have a rust preventive treatment and be free from pits, nodules, burrs, cracks, and other conditions that adversely affect the performance or safety of the pliers. When provided, coatings shall be adherent and free from any condition that interferes with their protective value, safety, and function. Shears may have a painted, lacquered, enameled, plated, black oxide, or natural finish.

5.5 Blades

Blades shall have hardness from 50 HRC to 61 HRC, and matching locations on the blades of any one pair of shears shall be within 4 HRC. Readings shall be taken within 0.12 in. of the cutting edge.

Type II blades shall be curved in the cutting (shearing) plane. One or both blades shall have serrated cutting edges. The serrations shall be evenly spaced and well defined throughout the effective length of the cutting blade.

5.6 Pivot

The pivot shall serve as a joint holding the blades together and shall provide a means for blade adjustment, other than peening. Pivot assembly components of Type I shears shall be made in accordance with one of the following requirements:

(a) hardened from 30 HRC to 40 HRC

(b) case hardened from 83 HR15N to 90 HR15N with a minimum case depth of 0.007 in.

The center pivot fastener of Type II shears shall be material having a minimum tensile strength of 150,000 psi and hardness of 30 HRC to 40 HRC.

5.7 Handles

Handles shall be free from flash and irregular or sharp projections and edges. All shears shall be provided with stops arranged to preclude the possibility of the handles being closed beyond the effective blade cutting point.

5.7.1 Handles for Type II Shears. Handles shall be provided with a mechanism to return the handles to the open position when the handle pressure is released. A handle-locking device shall be provided to keep shears in a closed position and designed so that it will not interfere with the operation of the shears.

5.7.2 Comfort Grips. Comfort grips shall be made of rubber, plastic, or other suitable material and shall meet the solvent resistance test specified in para. 6.5. The comfort grips shall remain securely attached under normal use of the shears.

Unless specifically designed, labeled, and tested for such use, tools with comfort grips shall not be advertised or marked as having any nonconductive or electrically insulating properties.

6 TESTS

WARNING: Many tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be employed in conducting these tests. These tests are designed to evaluate the tools and materials and do not condone the use of the tools in an environment, or in a manner, inconsistent with safe use of the tools.

6.1 Hardness

Hardness tests shall be conducted in accordance with ASME B107.25.

6.2 Paper Cut Test

Shears shall cut one sheet of 0.003-in.-thick bond paper (25% minimum rag content) both before and after being tested as specified in para. 6.3. At least 11 in. of the paper shall be cut cleanly, without having torn or ragged edges, using the shears' full length of cut.

6.3 Metal Cut Tests

Shears shall be capable of cutting cold-rolled steel conforming to ASTM A 1008/A 1008M and AISI 304 or 316 (annealed) stainless steel conforming to ASTM A 240/A 240M of the applicable gage, for each Type and Class specified in Tables 1 and 2.

6.3.1 Load Cut Test. The first cut shall be made parallel to the 3-in. side of a 3 in. × 12 in. long strip, 0.50 in. from the end. Each succeeding cut shall be spaced 0.50 in. from the preceding cut until ten cuts have been made in both cold-rolled and stainless steel. The entire length of the cutting edges shall be used in making each cut. The test load required to make these cuts shall not exceed the values specified in the applicable table. The test load shall be applied across the gripping position by a test machine or other suitable device in accordance with methods of testing option 1, 2, or 3 (see Figs. 12 through 14). The handle gap when in the closed position shall not change by more than 5% of the initial measurements when measured before and after the load cutting test. Type I measurements shall be taken of the gap between handles midway between center pivot bolt and start of handle bow. Type II measurements shall be taken at the extreme ends of the handles.

6.3.2 Narrow Width Cutting Test for Type II Shears. Following the test in para. 6.3.1, shears shall make five full-length cuts of 26-gage SAE C1010 commercial steel strapping. These cuts shall be made parallel to one another, 0.046 in. to 0.078 in. apart. Shears shall cut the test strip cleanly, and spiral or roll up each sheared metal strip, diverting it from the handle area.

6.3.3 Serration Grip Test for Type II Shears. One full-length cut shall be made in accordance with Table 2 to determine whether the blade serrations are of sufficient depth and sharpness to prevent slippage of the material during cutting. No slippage shall occur during cutting.

6.3.4 Tip End Cutting Test for Type II Shears. Following the serration grip test, two cuts shall be made in material in accordance with Table 2 with a 90-deg bend made 0.75 in. back from the edge of the material. The tip end of one jaw shall be butted against the 90-deg bend of the test sheet. The metal shall be cut cleanly; evidence of tearing or failure to cut any portion from the edge up to the 90-deg bend of the test material shall constitute failure.

6.3.5 Shim Cutting Test for Type II Shears. Upon completion of the metal cutting tests covered in paras. 6.3.1 through 6.3.4, shears shall cleanly cut 0.010 in. shim stock (SAE C1010 steel at 90 HRB minimum) for the full length of cutting edges. The test shall be performed with the operator using one hand only on the shears and the shim stock unsupported.

6.3.6 Cheesecloth Cutting Test for Type II Shears. Shears shall cut a single thickness of clean, bleached, unsized Nos. 40 through 60 mesh cheesecloth for the full length of cut. This test shall be performed with the operator using one hand only on the shears and making three separate cuts. The cheesecloth shall be cut cleanly for the full length of each cut.

6.4 Wear Tests for Type II Shears

Shears shall make three full-length cuts in material in accordance with Table 2. The maximum handle force reading from these cuts shall be recorded for the shears tested, and then 100 additional full-length cuts shall be taken with the shears but no readings recorded. Three more full-length cuts shall be made with the shears and a second set of maximum handle force readings recorded.

标准分享网 www.bzfxw.com 免费下载

Second maximum readings shall not exceed the first maximum readings by more than 10%. After the above tests are completed, a full-length cut shall be made using the steel specified in Table 2. Cut shall meet the minimum length of cut specified in Table 2.

6.5 Comfort Grips Solvent Resistance Test

Shears with comfort grips shall be tested per ASME B107.25.

6.6 Cycle Test

Shears shall make 30,000 cuts of cold-rolled steel strip within the maximum test load specified in the applicable table for the nominal size of shears being tested. The cold-rolled steel strips shall be the same material referenced in para. 6.3 and shall be 0.12 in. less in width than that specified for the minimum length of cut in the applicable tables for that particular shears. Shears must complete test without requiring repair or adjustment to blades or any components. Type II shears shall return to the open position after each cut without assistance.

7 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

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

Shears shall be in proper adjustment. Proper adjustment shall be interpreted as meaning that the blades shall open and close smoothly and easily, while maintaining a single contact point, without binding or causing folding of the material.

Fig. 1 Type I, Class 1, Style A

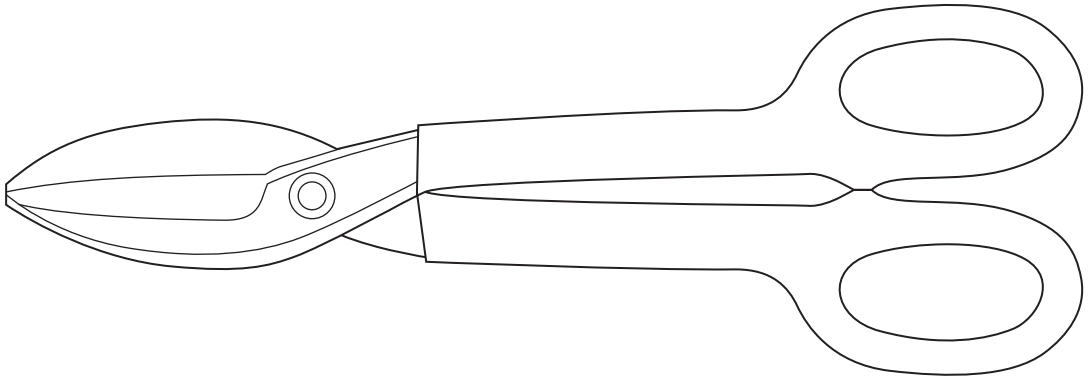


Fig. 2 Type I, Class 1, Style B

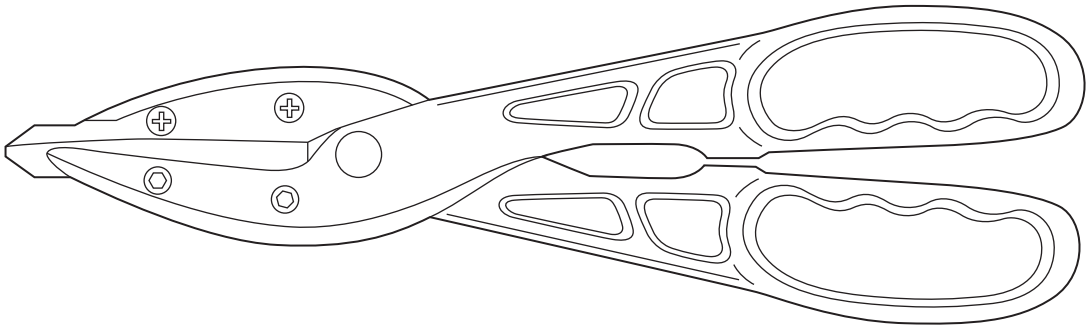
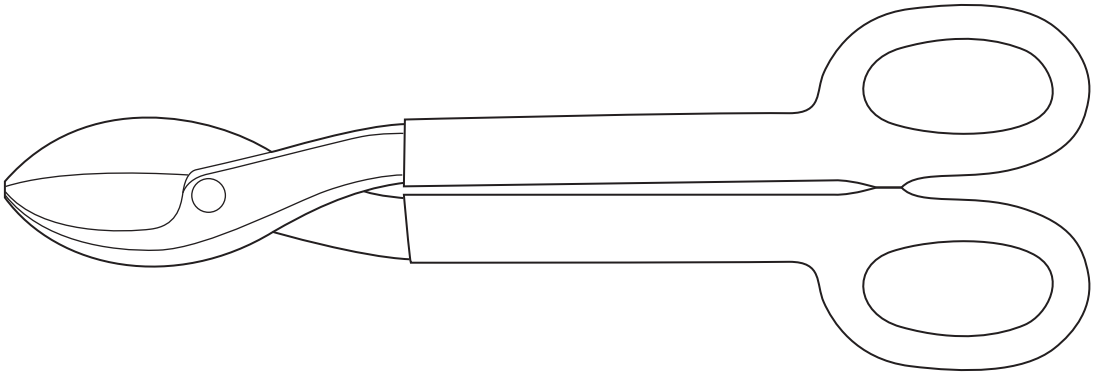


Fig. 3 Type I, Class 1, Style C



标准分享网 www.bzfxw.com 免费下载

Fig. 4 Type I, Class 2

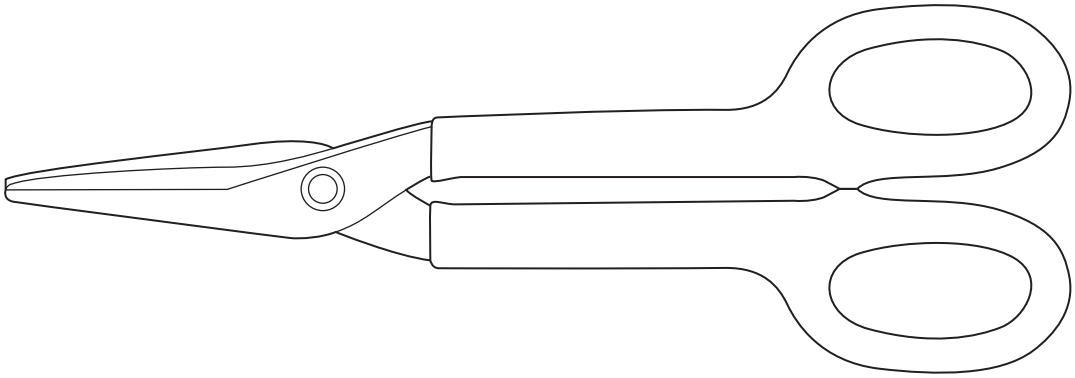


Fig. 5 Type II, Class 1, Straight Cutting Style A Regular

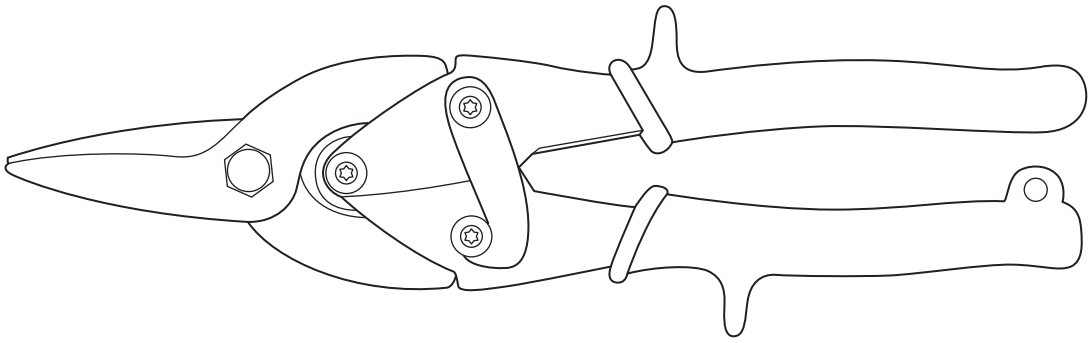


Fig. 6 Type II, Class 1, Straight Cutting Style B Bulldog

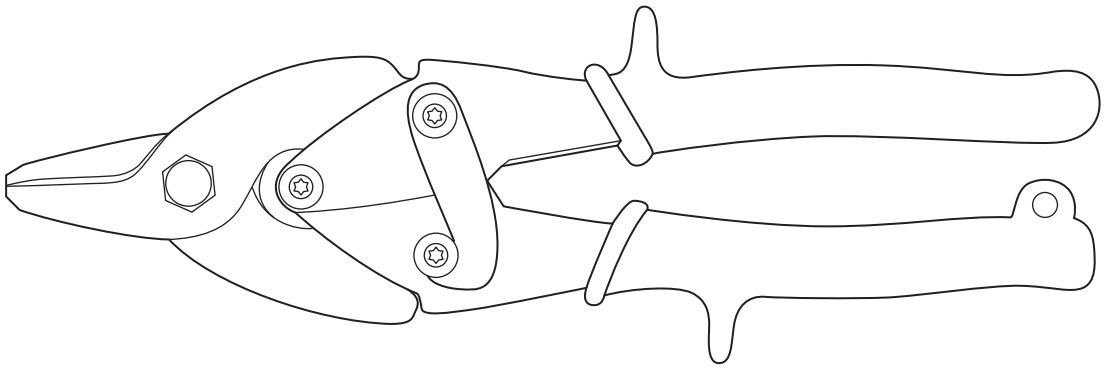


Fig. 7 Type II, Class 1, Straight Cutting Style C Long Cut

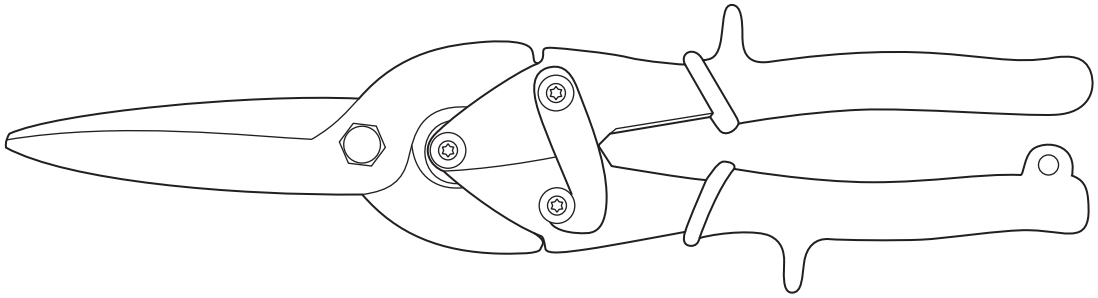


Fig. 8 Type II, Class 2, Straight and Circular Cutting to the Right

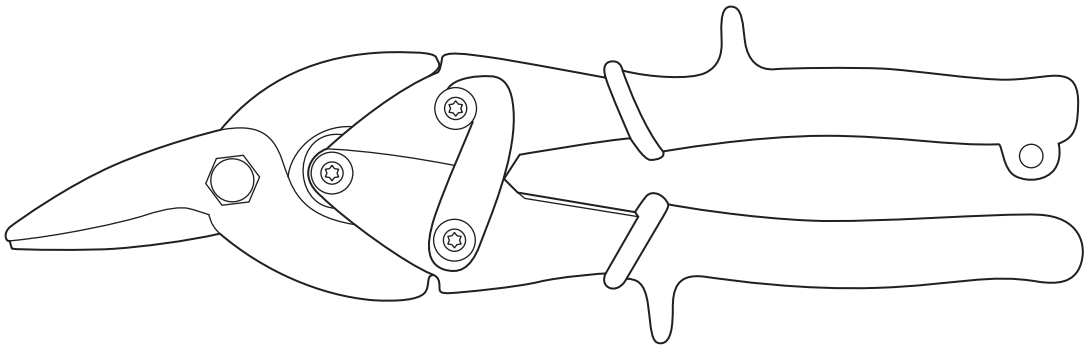
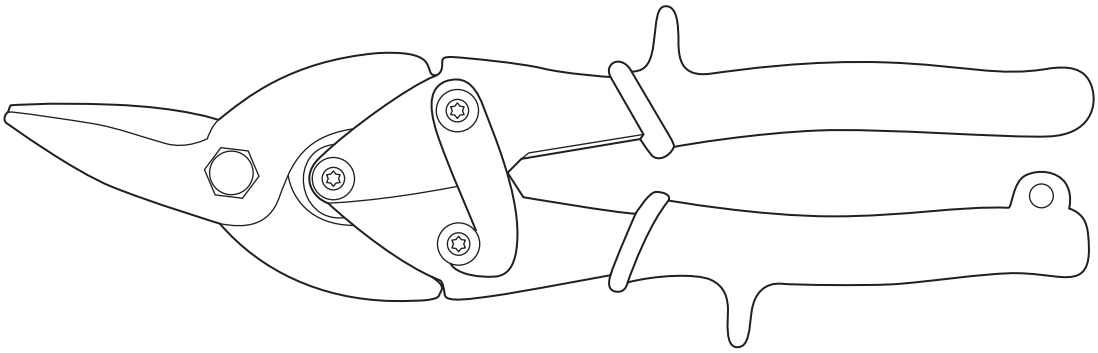


Fig. 9 Type II, Class 3, Straight and Circular Cutting to the Left



标准分享网 www.bzfxw.com 免费下载

Fig. 10 Type II, Class 4, Offset Jaw, Straight and Circular Cutting to the Right

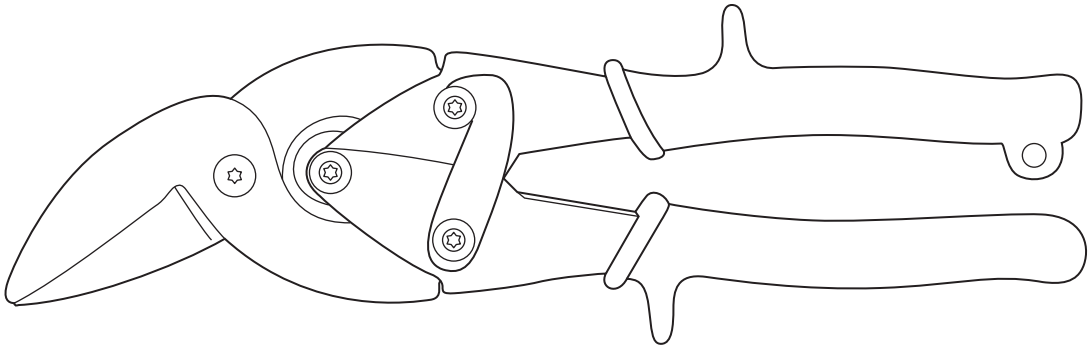


Fig. 11 Type II, Class 5, Offset Jaw, Straight and Circular Cutting to the Left

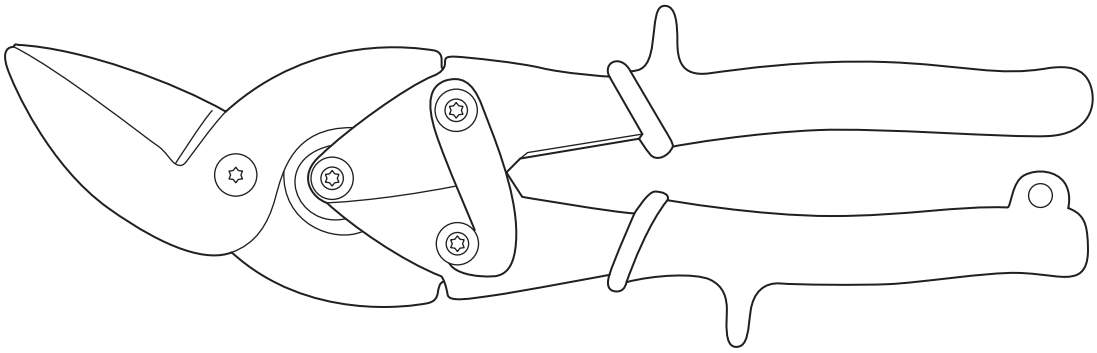
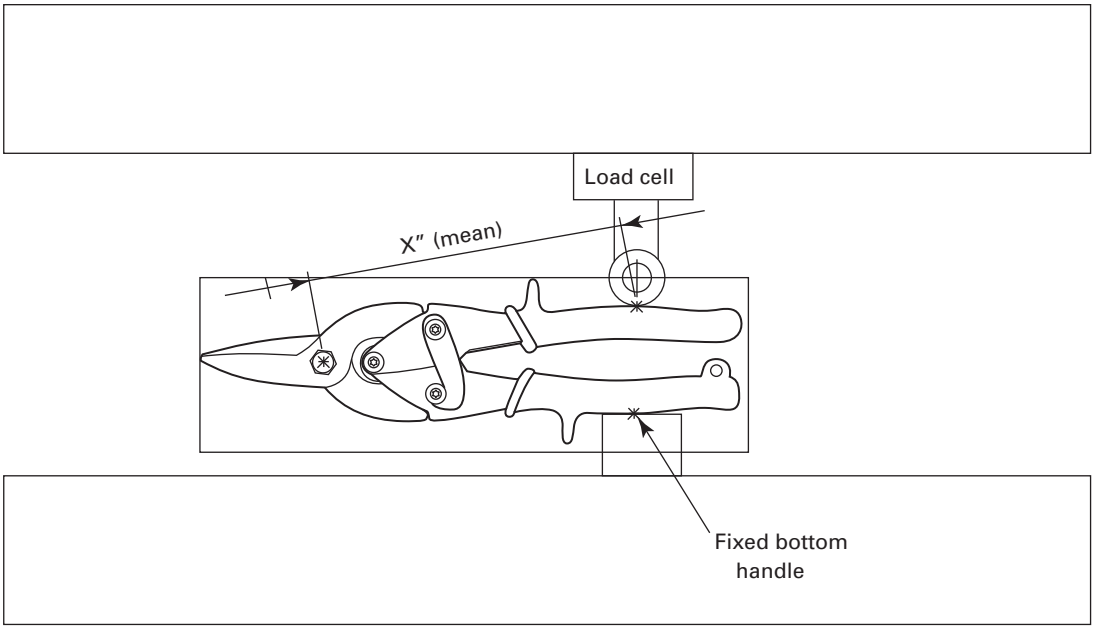


Fig. 12 Method of Testing Torque — Method #1



Method #1 [Note (1)]

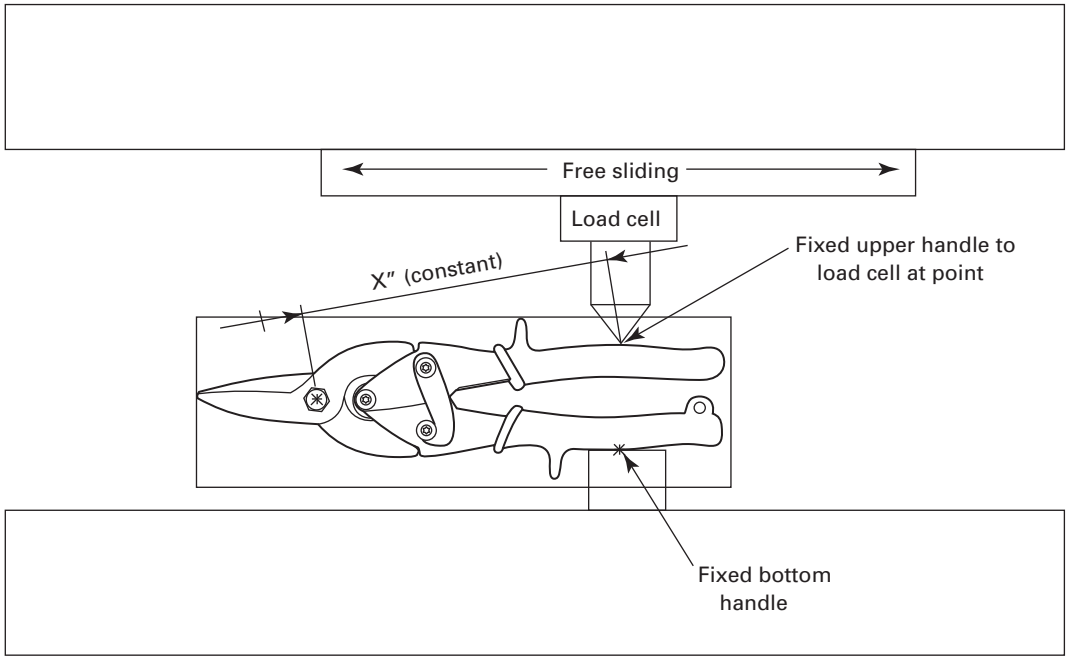
GENERAL NOTE: See Tables 1 and 2.

NOTE:

(1) The dimension from the point of load to the center of the center pivot bolt is defined as the average distance that the point of load is away from the center of the center pivot bolt during the duration of the test cycle. The lower handle is fixed to the test machine.

标准分享网 www.bzfxw.com 免费下载

Fig. 13 Method of Testing Torque — Method #2



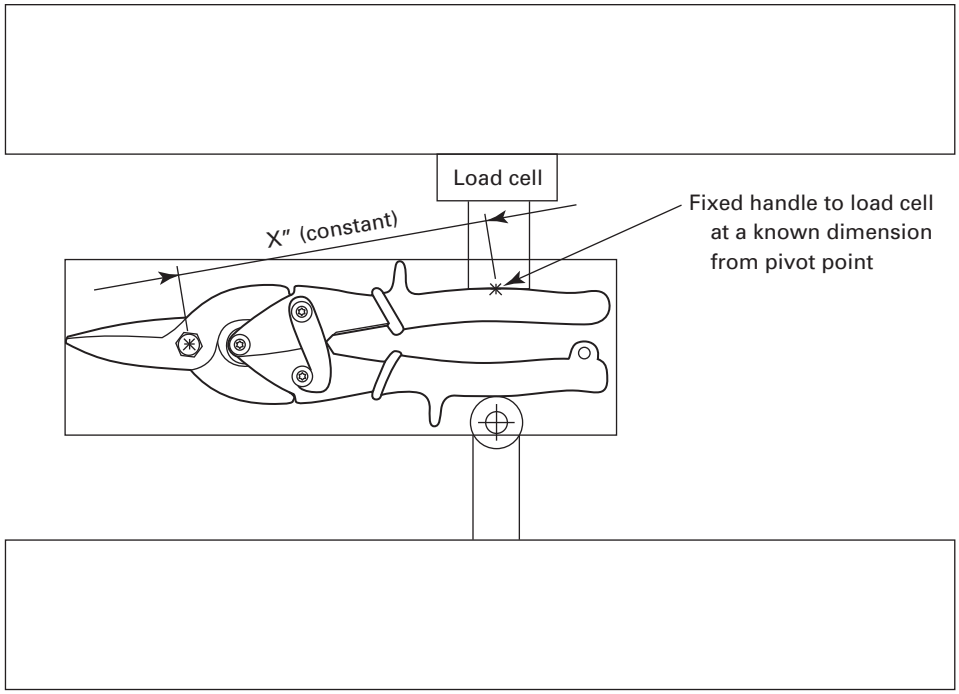
Method #2 [Note (1)]

GENERAL NOTE: See Tables 1 and 2.

NOTE:

(1) The dimension from the center of the center pivot bolt to the point of load on the handle is a constant dimension. The lower handle is fixed to the test machine. Through the entire test cycle, the point of load cannot travel along the handle. To handle the horizontal movement required during the test cycle, the load cell needs to be capable of moving freely in the horizontal direction.

Fig. 14 Method of Testing Torque — Method #3



Method #3 [Note (1)]

GENERAL NOTE: See Tables 1 and 2.

NOTE:

(1) The dimension from the center of the center pivot bolt to the point of load on the handle is a constant dimension. The upper handle is fixed to the load cell at the point of load. The test fixture is allowed to travel along the lower handle during the test cycle.

标准分享网 www.bzfxw.com 免费下载

Table 1 Type I Shears

Class	Style	Nominal Size, in.	Minimum Length of Cut, in.	Test Material		Maximum Test Torque Limit, lbf-in. [Note (2)]
				Cold Rolled Steel Gage [Note (1)]	Stainless Steel Gage [Note (1)]	
1	A	7	1.62	24	28	175
1	A	8	1.75	24	28	207
1	A	10	2.00	22	26	562
1	A	$12\frac{1}{2}$	2.75	20	22	960
1	B	12	2.75	26	28	480
1	B	13	2.75	26	28	480
1	B	14	2.75	26	28	480
1	C	16	2.25	16	18	1,683
2	...	7	1.50	26	28	155
2	...	10	2.00	24	26	450
2	...	$12\frac{1}{2}$	2.75	22	24	750

NOTES:
(1)

Steel Gage	Thickness, in.
16	0.0635–0.0568
18	0.0508–0.0449
20	0.0388–0.0344
22	0.0313–0.0284
24	0.0254–0.0225
26	0.0194–0.0172
28	0.0156–0.0142

(2) See methods of testing torque — methods options 1, 2, and 3.

Table 2 Type II Shears

Class	Style	Nominal Size, in.	Minimum Length of Cut, in.	Test Material		Maximum Test Torque Limit, lbf-in. [Note (2)]
				Cold Rolled Steel Gage [Note (1)]	Stainless Steel Gage [Note (1)]	
1	A	10	1.18	18	22	510
1	B	9	0.75	16	18	720
1	C	12	3.00	24	28	555
2, 3	. . .	10	1.18	18	22	480
4, 5	. . .	9	1.18	18	22	480

NOTES:
(1)

Steel Gage	Thickness, in.
16	0.0635–0.0568
18	0.0508–0.0449
20	0.0388–0.0344
22	0.0313–0.0284
24	0.0254–0.0225
26	0.0194–0.0172
28	0.0156–0.0142

(2) See methods of testing torque — methods options 1, 2, and 3.

标准分享网 www.bzfxw.com 免费下载

ASME B107.18

PLIERS: WIRE TWISTER

1 SCOPE

This Standard provides performance and safety requirements for wire twister pliers, which are used primarily for securing safety wires. Inclusion of dimensional data in this Standard is not intended to imply that all products described herein are stock production sizes. Consumers should 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 DEFINITIONS

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

3 REFERENCES

The following documents are referenced in this Standard. The latest edition shall be used.

ASTM A 313, Standard Specification for Stainless Steel Spring Wire

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: The Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591 (www.hti.org)

4 CLASSIFICATIONS

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)

5 PERFORMANCE 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. Pliers shall pass applicable tests in para. 6 without cracking or breaking.

5.1 Design

Wire twister pliers shall conform to Table 1 for the size specified, shall be similar to those shown in Fig. 1, and shall meet the dimensional requirements of Fig. 2 or Fig. 3.

Wire twister pliers shall incorporate a twist rod, 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 that will permit the user to swiftly and easily deflect double strands of wire out of the sides of the

标准分享网 www.bzfxw.com 免费下载

jaws and away from the cutting edges when performing continuous (multiple) lock wiring operations.

The nose design shall be as shown in Figs. 2 and 3 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. 2 and 3. Jaw surfaces and edges shall not damage the wire being twisted.

5.2 Materials

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

5.3 Finish

Metallic surfaces shall have a rust preventive treatment and be free from pits, nodules, burrs, cracks, and other conditions that adversely affect the performance or safety of the pliers. When provided, coatings shall be adherent and free from any condition that interferes 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 manufacturer can 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.

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. size, $2\frac{1}{2}$ rotations (with automatic return, 2 rotations)

(b) for 9-in. size, 3 rotations (with automatic return, $2\frac{1}{2}$ rotations)

(c) for 12-in. size, 4 rotations (with automatic return, $3\frac{1}{2}$ rotations) (Type III Reversible, 3 rotations)

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

5.9 Locking Device

The locking device shall be so designed that when the pliers' jaws are closed, the handles must be further compressed 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

WARNING: Many tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be employed in conducting these tests. These tests are designed to evaluate the tools and materials and do not condone the use of the tools in an environment, or in a manner, inconsistent with safe use of the tools.

6.1 Test Equipment

The equipment required for performing the wire-twisting tests shall consist of a coupler securely attached to a 35 lb ± 0.5 lb weight so that a 0.051-in. 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. and shall provide from 7.5 in. to 7.88 in. 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 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. 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 in.) shall be made. After completing the cuts, pliers shall lift a weight of 35 lb suspended on a 0.020-in. wire.

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

6.4 Solvent Resistance Test

Nonmetallic components shall be tested per ASME B107.25.

6.5 Hardness Test

Hardnesses specified herein shall be tested per ASME B107.25.

6.6 Joint Integrity Test

Pliers shall be tested per ASME B107.25 using a minimum of 1.50 lbf. Maximum allowable play shall be 0.01 in. per inch.

6.7 Pull Knob Security Test

With the spiral rod in the retracted position, a 100-lbf 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 load for 1 min. After completion of the test, the 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*.

标准分享网 www.bzfxw.com 免费下载

Fig. 1 Pliers, Wire Twister, With Side Cutter in Locked Position

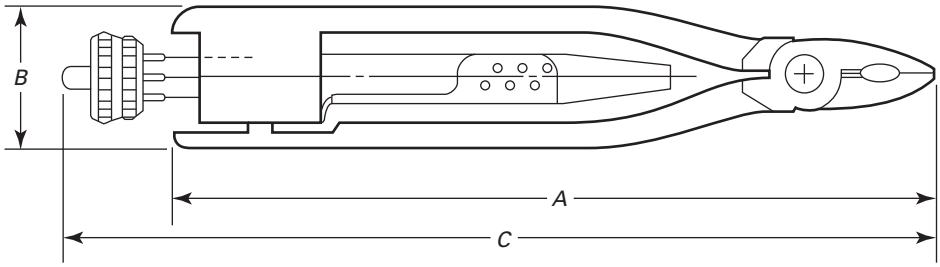
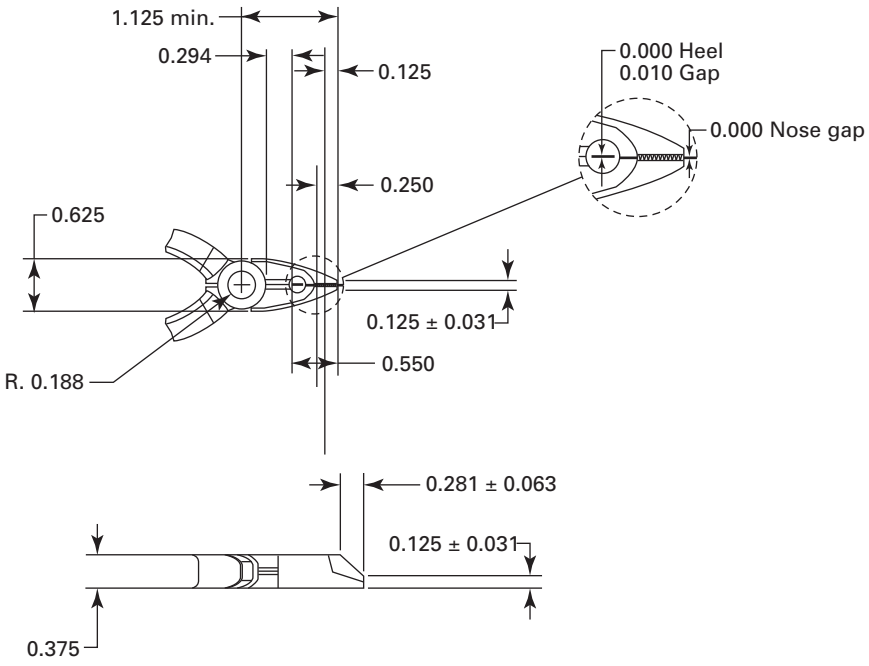
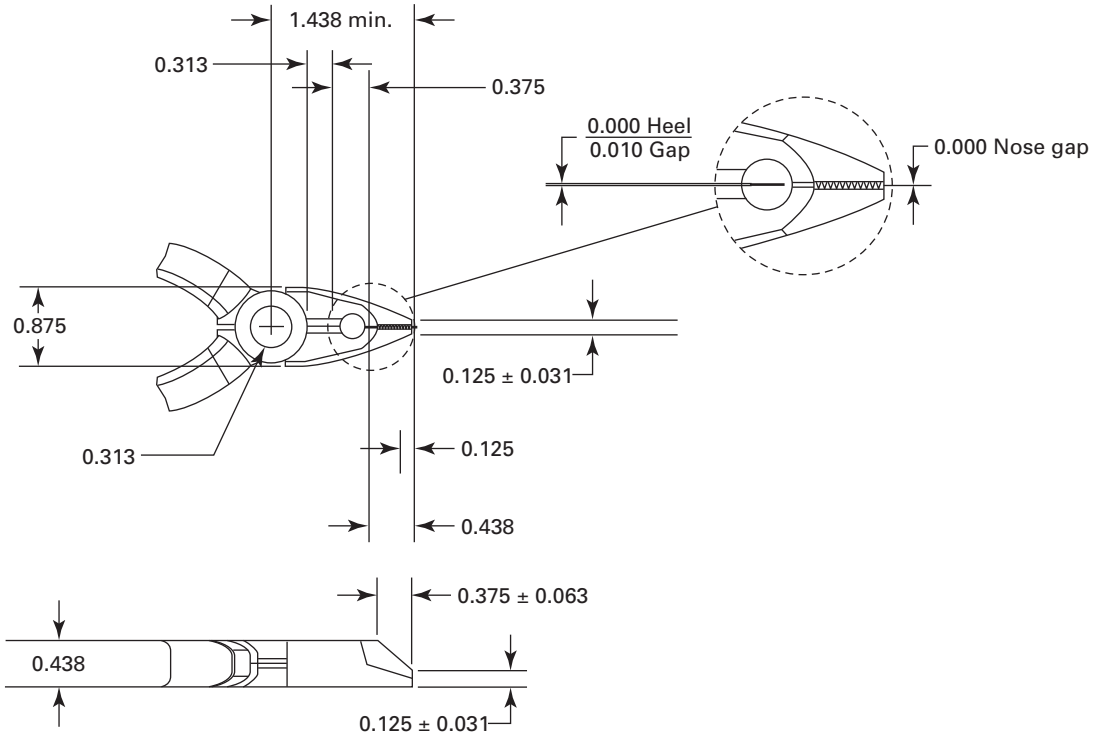


Fig. 2 Nose Design, Pliers, Wire Twister, 6 in.



GENERAL NOTE: All dimensions are ±0.015 unless otherwise noted.

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



GENERAL NOTE: All dimensions are ±0.015 unless otherwise noted.

Table 1 Dimensions of Pliers, Wire Twister, With Side Cutter (See Fig. 3)

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 2 Wire Cut Test Parameters

Nominal Size	Double Cut Wire Sizes, in.	Load Application Distance Form 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.

标准分享网 www.bzfxw.com 免费下载

ASME B107.19

PLIERS: RETAINING RING

1 SCOPE

This Standard provides performance and safety requirements for pliers suitable for inserting and removing internal and external retaining rings, including those covered by ASME B18.27. Inclusion of dimensional data in this Standard does not mean that all pliers described herein are stock production sizes. Consumers should 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 covered tools.

2 DEFINITIONS

convertible: changeable from internal to external setting by disassembly.

shroud: device used to limit tip travel on external ring pliers.

universal: changeable from internal to external setting without disassembly.

3 REFERENCES

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

ASME B18.27, Tapered and Reduced Cross Section Retaining Rings (Inch Series)

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900 (www.asme.org)

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

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

4 CLASSIFICATIONS

Type I: retaining ring, internal
- *Class 1:* with adjustable jaw stop and spring
  - Style A: straight tip
  - Style B: 90-deg tip
  - Style C: 45-deg tip
- *Class 2:* without adjustable jaw stop and spring
  - Style A: straight tip
  - Style B: 90-deg tip
  - Style C: 45-deg tip

Type II: retaining ring, external
- *Class 1:* with fixed jaw stop and spring
  - Style A: straight tip
  - Style B: 90-deg tip
  - Style C: 45-deg tip
- *Class 2:* with adjustable jaw stop and spring
  - Style A: straight tip
  - Style B: 90-deg tip
  - Style C: 45-deg tip
- *Class 3:* without jaw stop and spring
  - Style A: straight tip
  - Style B: 90-deg tip
  - Style C: 45-deg tip
- *Class 4:* grip ring pliers, with adjustable jaw stop and spring
  - Style B: 90-deg tip
  - Style C: 45-deg tip
  - Style E: 20-deg tip

Type III: retaining ring, external (automotive)
- *Class 1:* straight jaw
- *Class 2:* knurled jaw

Type IV: pliers with replaceable tips
- *Class 1:* with spring
- *Class 2:* with ratchet or with ratchet and spring
- *Class 3:* with double ratchet

Type V: retaining ring, internal and external (convertible)
  - Style A: straight tip
  - Style B: 90-deg tip
  - Style C: 45-deg tip

Type VI: retaining ring, replaceable tips, internal and external (universal)
- *Class 1:* with spring
  - Style A: straight tip
  - Style B: 90-deg tip
- *Class 2:* with spring and adjustable jaw stop
  - Style A: straight tip
  - Style B: 90-deg tip

标准分享网 www.bzfxw.com 免费下载

5 PERFORMANCE REQUIREMENTS

The illustrations shown herein are descriptive and not restrictive and are not intended to preclude the manufacture of pliers that otherwise comply with this Standard. All figures are shown without comfort grips. Dimensions in tables are in inches unless otherwise indicated and are for pliers without comfort grips.

5.1 Materials

The materials used in the manufacture of pliers shall be such as to produce pliers conforming to this Standard.

5.2 Design

Pliers shall be similar to the figure to which reference is made and shall be proportioned in all parts so as to be strong, durable, and easy to operate. Pliers shall be designed to install and remove the range of ring sizes specified in the applicable tables. Pliers shall withstand applicable test procedures without cracking or breaking.

5.2.1 Type I, Pliers, Retaining Ring, Internal. Pliers shall have integral tips for compressing internal retaining rings similar to those shown in Fig. 1. Pliers shall pass the ring contraction test specified in para. 6.1 and the tip load test specified in para. 6.4.

5.2.1.1 Class 1, With Adjustable Jaw Stop and Spring. Pliers shall conform to the requirements of Table 1 and shall be similar to Fig. 2.

5.2.1.2 Class 2, Without Adjustable Jaw Stop and Spring. Pliers shall conform to the requirements of Table 1 and shall be similar to Fig. 3.

5.2.2 Type II, Pliers, Retaining Ring, External. Pliers shall have integral tips for expanding external retaining rings similar to those shown in Fig. 4. Pliers shall pass the ring expansion test specified in para. 6.2 and the tip load test specified in para. 6.4.

5.2.2.1 Class 1, With Fixed Jaw Stop and Spring. Pliers shall have a cover or stop to prevent over-expansion of rings. Pliers' sizes shall conform to the requirements of Table 2 and be similar to Fig. 5.

5.2.2.2 Class 2, With Adjustable Jaw Stop and Spring. Pliers shall conform to the requirements of Table 3 and shall be similar to Fig. 6.

5.2.2.3 Class 3, Without Jaw Stop and Spring. Pliers shall conform to the requirements of Table 3 and be similar to Fig. 7.

5.2.2.4 Class 4, Grip Ring Pliers, With Adjustable Jaw Stop and Spring. Pliers shall be suitable for expanding external grip rings and external heavy duty type rings similar to those shown in Fig. 4. Pliers shall conform to the requirements of Table 4 and be similar to Fig. 8.

5.2.3 Type III, Pliers, Retaining Ring, External (Automotive). Pliers shall be provided with a spring for holding the jaws in a closed position. Pliers shall pass the test in para. 6.5.

5.2.3.1 Class 1, Straight Jaw. Pliers shall have tapered jaws. The outside of the jaws at the tip end shall be serrated or knurled. Pliers shall conform to the dimensions shown in Fig. 9.

5.2.3.2 Class 2, Knurled Jaw. Pliers shall be capable of expanding (horseshoe) "C" washers and lock rings, similar to those shown in Fig. 10. The tip end of the jaws shall be at right angles to the longitudinal axis of the jaws and the outside serrated or knurled. Pliers shall conform to the requirements of Table 5 and be similar to Fig. 11.

5.2.4 Type IV, Pliers With Replaceable Tips, Retaining Ring, Internal and External. Pliers shall be of either internal design for compressing rings similar to Fig. 1 or external design for expanding rings similar to Fig. 4. Pliers shall pass the applicable ring contraction test specified in para. 6.1 or the ring expansion test specified in para. 6.2. Pliers shall also pass the tip load test specified in para. 6.4 and the replaceable tip pull-off test specified in para. 6.6.

5.2.4.1 Class 1, With Spring. Pliers shall conform to the dimensions shown in Fig. 12. Replaceable tips shall conform to the requirements of Table 6 and be similar to Fig. 13.

5.2.4.2 Class 2, With Ratchet or With Ratchet and Spring. The ratchet shall be designed in such a manner that the jaw may be locked and released in any position within the capacity of the pliers. The locking arrangement of the ratchet shall be capable of being released with the hand maintaining a grip on the handle. The pliers shall conform to the dimensions in Fig. 14. Replaceable tips shall conform to the dimensions in Table 7 and be similar to Fig. 13.

5.2.4.3 Class 3, With Double Ratchet. The ratchet shall be designed in such a manner that the jaw may be locked and released in any position within the collapsing or expanding capacity of the pliers. The locking arrangement of the ratchet shall be spring-loaded and capable of being released with the hand maintaining a grip on the handle. The pliers shall conform to the requirements of Table 8 and be similar to Fig. 15. Replaceable tips shall conform to the requirements of Table 7 and be similar to Fig. 13.

5.2.5 Type V, Pliers, Retaining Ring, Internal and External (Convertible). Pliers shall have integral tips for compressing internal retaining rings similar to those shown in Fig. 1 and expanding external rings similar to those shown in Fig. 4, except for grip style and heavy duty rings. Pliers shall pass tests specified in paras. 6.1,

6.2, and 6.4. Pliers shall conform to the requirements of Table 9 and be similar to Fig. 16. Pliers shall have all parts captive with either of the two jaw-handle sections so that it is not necessary to detach any parts from either of the jaw-handle sections to change the pliers' setting.

5.2.6 Type VI, Pliers, Retaining Ring, Replaceable Tips, Internal and External (Universal). Pliers shall be suitable for compressing internal retaining rings similar to Fig. 1 and for expanding basic-type and inverted-type rings similar to Fig. 4. The pliers shall pass tests in paras. 6.1 and 6.2. Replaceable tips shall conform to the dimensions in Tables 6 and 7 and Fig. 13. Pliers shall conform to the requirements of Table 10 and be similar to Fig. 17.

5.3 Handles

5.3.1 Characteristics. Handles shall be shaped to provide a comfortable grip and shall be free from rough edges and sharp corners. Outer hand gripping surfaces shall be smooth, knurled, impressed, or furnished with comfort grips.

5.3.2 Comfort Grips. When comfort grips are furnished on handles, they shall be made of rubber, plastic, or other suitable material capable of withstanding normal use without deteriorating or rubbing off and shall pass the solvent resistance test specified in para. 6.7. Comfort grips shall remain permanently attached under normal use. Unless specifically designed, labeled, and tested for such use, tools with comfort grips shall not be advertised or marked as having any nonconductive or electrically insulating properties.

5.4 Joint

5.4.1 Construction. There shall be no excessive sideways movement, play, or other indication of looseness when pliers are opened or closed that will affect their function.

5.4.2 Fastener Hardness. The fastener hardness shall be from 25 HRC to 50 HRC except that when the fastener receives a case-hardening treatment, a maximum hardness equivalent to 60 HRC shall be permitted.

5.5 Jaws

Jaws shall operate through the required pliers' movement without binding and shall be either integral with, or securely affixed to, the handles. Depending on the type and style, the tips of the jaws shall be either integral with, or securely joined to, the jaws.

5.6 Tips

Tips shall have a hardness of 45 HRC to 55 HRC. The tips shall be properly formed to provide for gripping and securely holding the retaining rings. Replaceable tips shall be interchangeable for use with both internal and external pliers and shall be held by a screw or similar means to ensure retention. Tips shall be within 5 deg of style description.

5.7 Spring

The spring, when supplied, shall be captive, durable, and capable of returning the handles to an open position.

5.8 Jaw Stops

5.8.1 Adjustable Jaw Stop. The adjustable jaw stop, when supplied, shall limit jaw travel such that the tip-to-tip distance may be set and changed by the user.

5.8.2 Fixed Jaw Stop. The fixed jaw stop (also referred to as a shroud), when supplied, shall limit the jaw travel to a specific tip-to-tip distance.

5.9 Finish

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

5.10 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 shall be readily determined. Types I, II, and V pliers shall also be marked with the pliers' tip size. 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.

6 TESTS

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

6.1 Ring Contraction Test

The test rings used for contraction tests shall comply with ASME B18.27.1 external type NA1, internal type NA2. One contraction of three test rings, of each test ring size specified in the applicable table (Table 1, 6, 7, or 8) for the pliers, shall be performed. The pliers' tips shall be fully inserted in the test ring. The ring shall then be contracted by pressure on the pliers' handles until the ring lugs contact each other. With the ring lugs contacting each other, the ring shall not become dislodged from the pliers' tips when the pliers' operator removes his hand from the ring. After completion of the above tests, one new ring of the smallest size, and one new ring of the largest size in the range of the specified

标准分享网 www.bzfxw.com 免费下载

pliers, shall be held loosely between the thumb and forefinger, while the pliers' tips are inserted in the ring holes to ensure that there was no pliers' tip deformation due to the ring contraction test. Pliers shall exhibit no evidence of cracks or breakage. Types V and VI pliers shall be assembled in the internal position, and there shall be no deformation during this test that would prevent assembly or disassembly.

6.2 Ring Expansion Test

One expansion of three test rings of each test ring size shall be performed. The pliers' tips shall be inserted fully in the test ring. The ring shall then be expanded by pressure on the pliers' handles until the internal diameter of the ring is at least 1% greater than the diameter of the shaft over which the ring is designed to pass during installation. After completion of the above tests, one new ring of the smallest and one new ring of the largest size, in the applicable size range of the pliers, shall be held loosely between the thumb and forefinger, while the pliers' tips are inserted in the ring holes to ensure that there was no pliers' tip deformation during the ring expansion test. Pliers shall exhibit no evidence of cracks or breakage.

6.2.1 Types II and IV Pliers. Test rings shall comply with ASME B18.27.1 type NA1 and ASME B18.27.3 type NA7 [see Note (1) of Table 2].

6.2.2 Types V and VI Pliers. Test rings shall comply with ASME B18.27.1 type NA1 and ASME B18.27.3 type NA7. Pliers shall be assembled in the external position, and there shall be no deformation during this test that would prevent assembly or disassembly.

6.3 Hardness Test

The hardness requirements specified in this Standard shall be tested in accordance with ASME B107.25, para. 4.3.

6.4 Tip Load Test, Types I, II, IV, V, and VI

Pliers shall meet the requirements of Table 11. The pliers under test shall be supported in a manner suitable for applying the load properly and determining the tip load (see Figs. 18 and 19). The pliers' tips shall be fully inserted in the tip restraint block. Loads shall be applied at the point of maximum-handle curvature. Handle load values shall be determined in accordance with formula $F = (\text{Tip Load} \times N)/H$ (see Fig. 19). If any part of the pliers breaks, cracks, or chips; if the handles contact each other during the test; or if there is permanent tip-to-tip deformation exceeding 0.002 in., the pliers have failed the test.

6.5 Tip Load Test, Type III

Suitable test equipment shall be used for load testing. The tips shall be fully inserted in the tip restraint block (see Figs. 18 and 19). Handle load of F lbf = 300 lbf-in./H in. shall be applied at the point of maximum handle curvature. Permanent set, as defined in ASME B107.25, shall not exceed 0.060 in. If any part of the pliers breaks, cracks, or chips or if the handles contact each other during the test, the pliers have failed the test.

6.6 Replaceable Tip Pull-Off Test

A 60-lbf load shall be applied to the tips for 5 sec, creating a straight pull-out force. There shall be no tip slippage.

6.7 Solvent Resistance Test

Pliers with comfort grips shall be tested in accordance with ASME B107.25, para. 4.5.

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 tip diameter

Fig. 1 Internal Retaining Rings

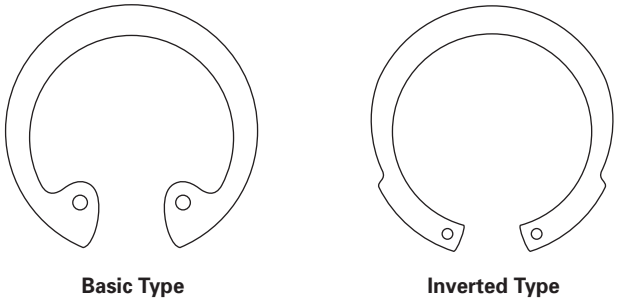
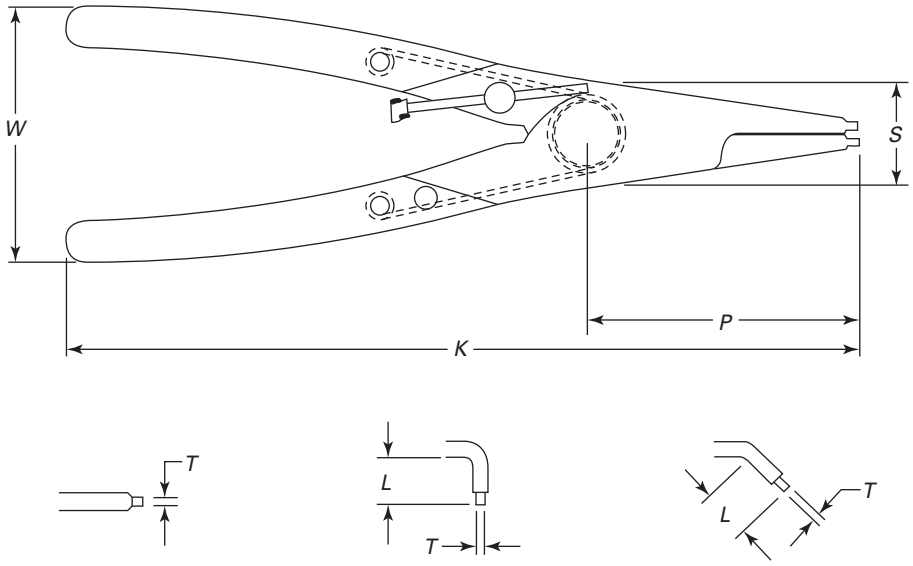
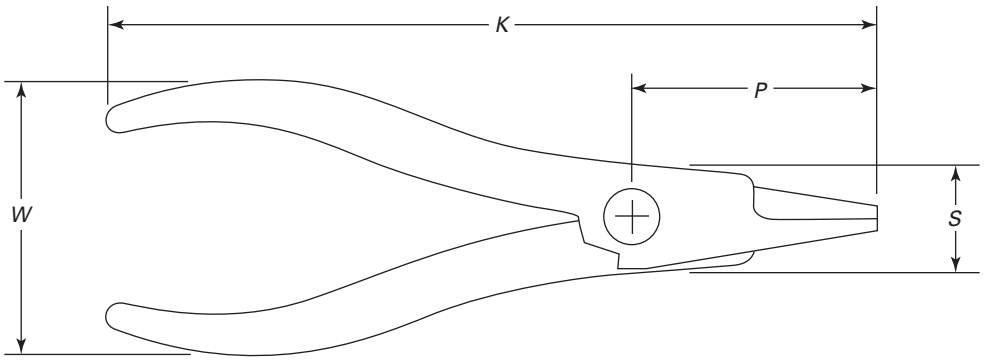


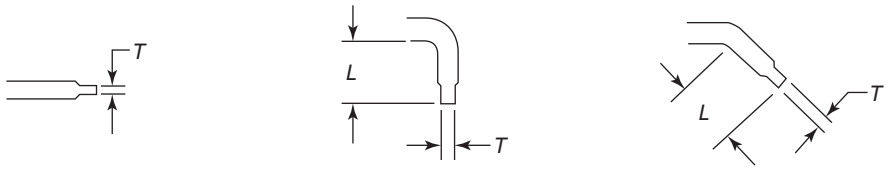
Fig. 2 Type I, Class 1



标准分享网 www.bzfxw.com 免费下载

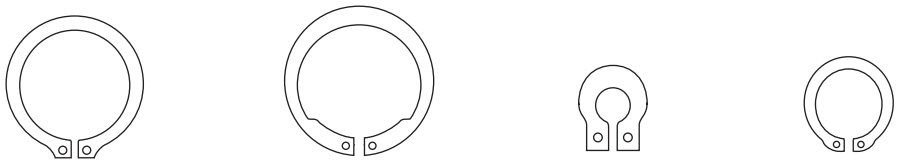
Fig. 3 Type I, Class 2





Style A: Straight Tip | Style B: 90-deg Tip | Style C: 45-deg Tip

Fig. 4 External Retaining Rings



Basic Type | Inverted Type | External Grip Ring | External Heavy Duty-Type Ring

Fig. 5 Type II, Class 1

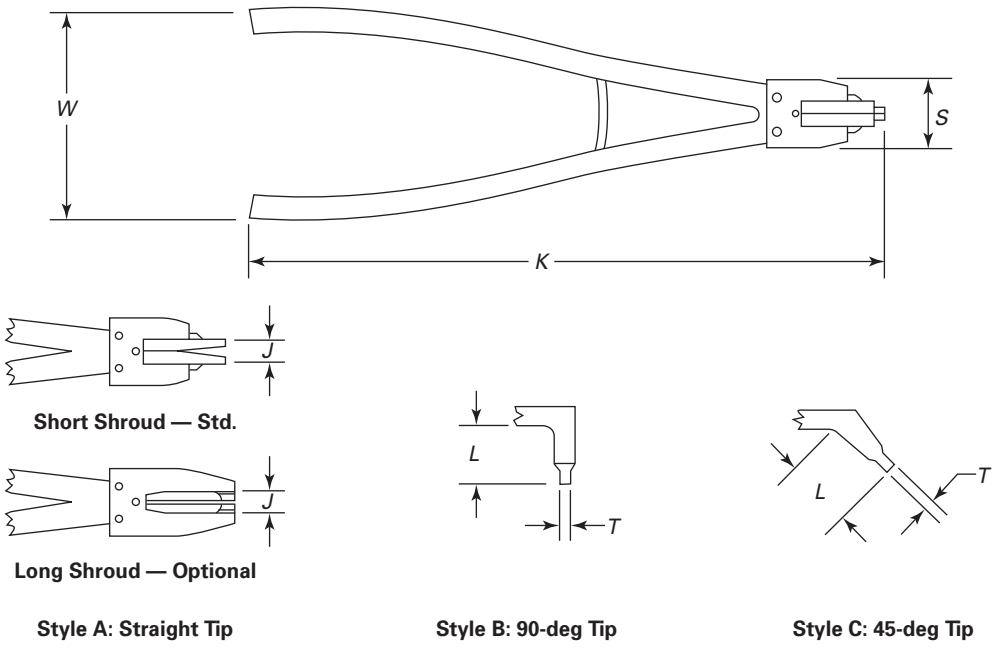
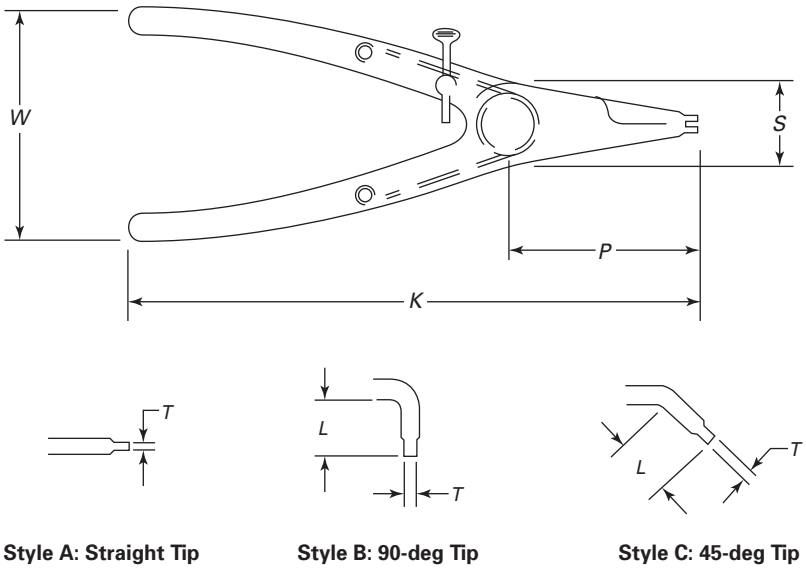
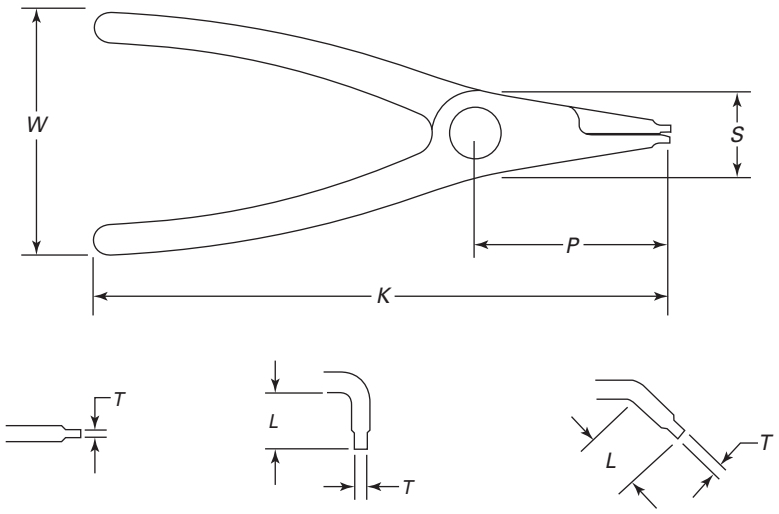


Fig. 6 Type II, Class 2



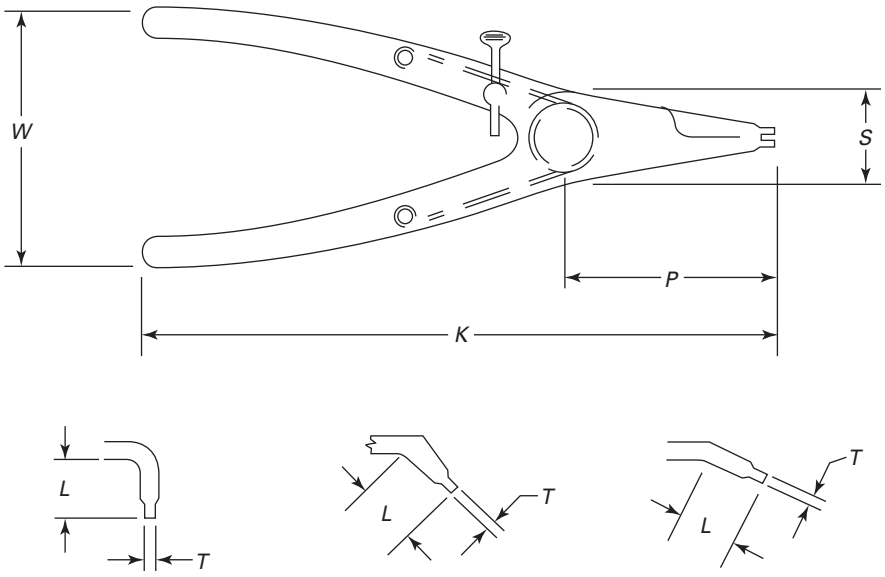
标准分享网 www.bzfxw.com 免费下载

Fig. 7 Type II, Class 3



Style A: Straight Tip **Style B: 90-deg Tip** **Style C: 45-deg Tip**

Fig. 8 Type II, Class 4



Style B: 90-deg Tip **Style C: 45-deg Tip** **Style E: 20-deg Tip**

Fig. 9 Type III, Class 1

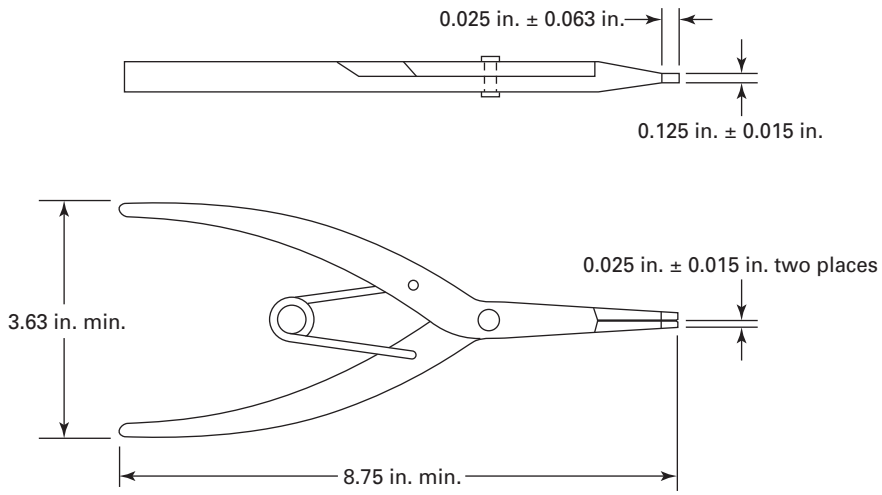


Fig. 10 External Retaining Rings (Lock Ring)

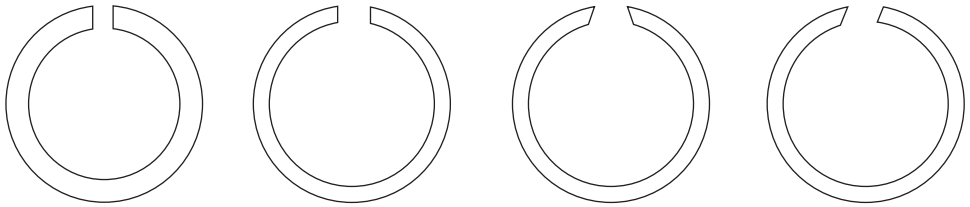
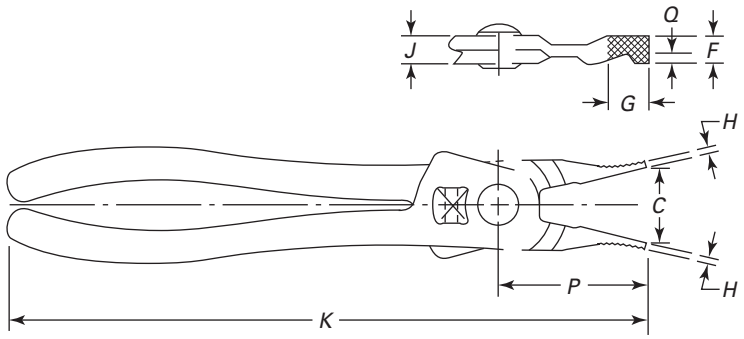
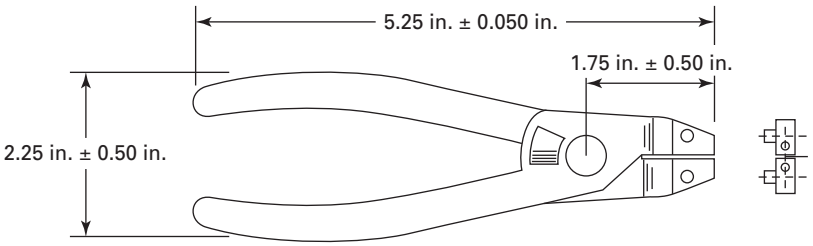


Fig. 11 Type III, Class 2

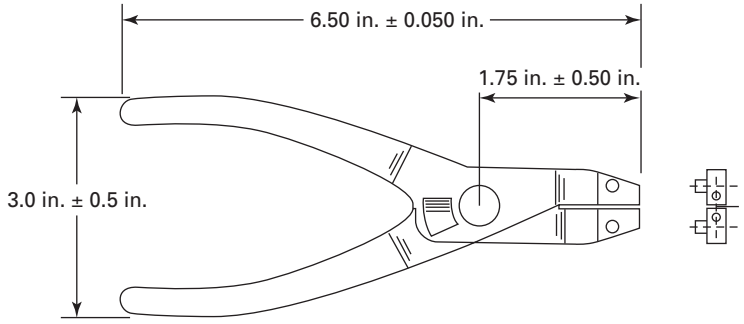


标准分享网 www.bzfxw.com 免费下载

Fig. 12 Type IV, Class 1



Internal Retaining Ring Pliers
(Handles Are in Fully Closed Position)



External Retaining Ring Pliers

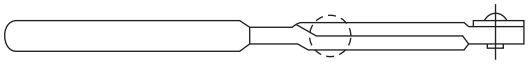
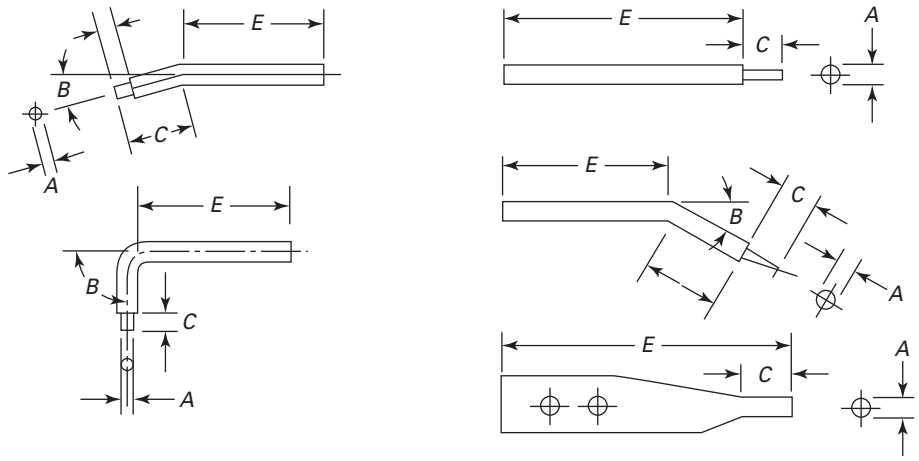


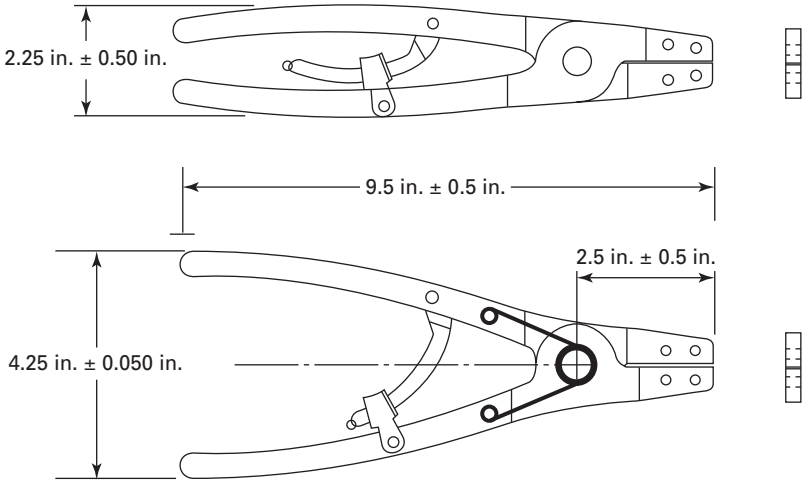
Fig. 13 Replaceable Tips



Hex Stock for Type IV, Class 2 and Type VI

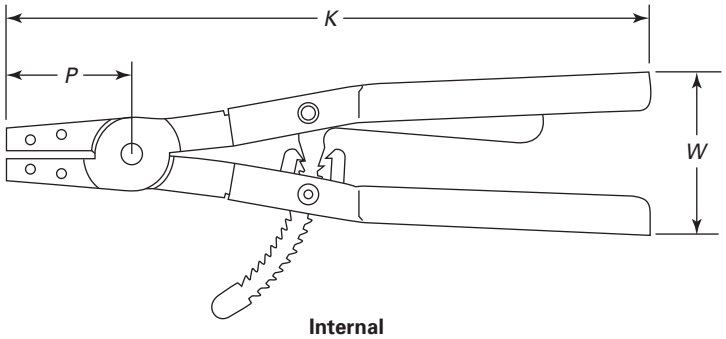
Plate Stock for Type IV, Classes 2 and 3

Fig. 14 Type IV, Class 2

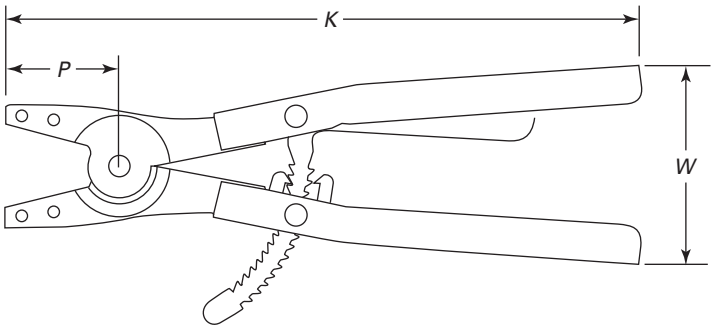


标准分享网 www.bzfxw.com 免费下载

Fig. 15 Type IV, Class 3

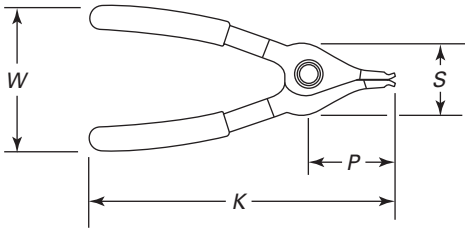


Internal

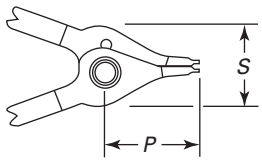


External

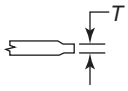
Fig. 16 Type V



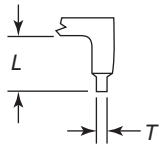
Internal Setting



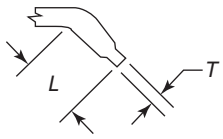
External Setting



Style A: Straight Tip



Style B: 90-deg Tip



Style C: 45-deg Tip

Fig. 17 Type VI

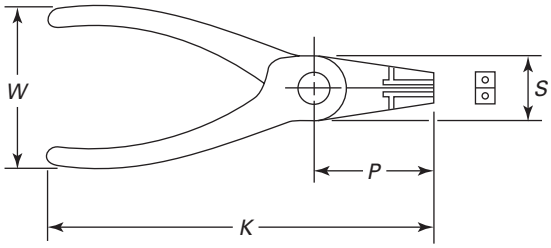
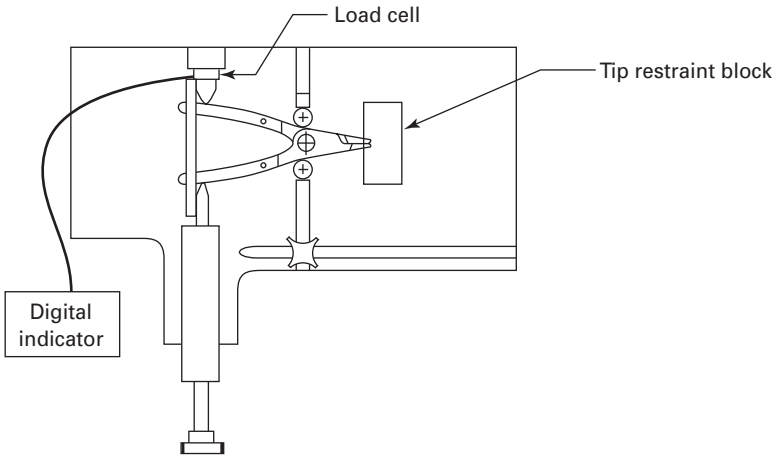
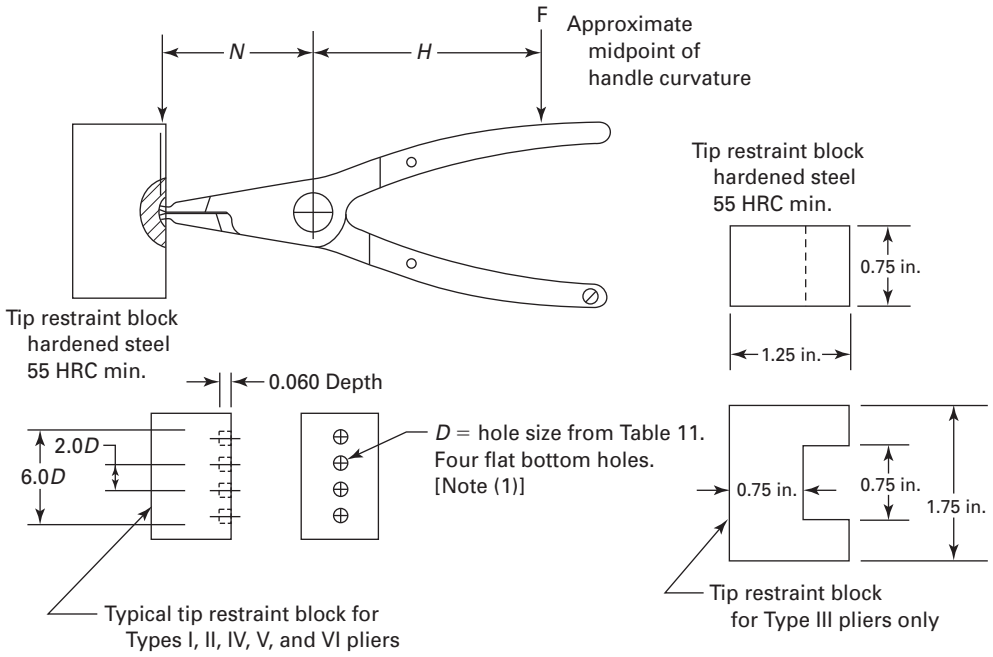


Fig. 18 Typical Apparatus for Applying Test Loads to Pliers



标准分享网 www.bzfxw.com 免费下载

Fig. 19 Tip Load Test Parameters



GENERAL NOTE: Always test with full tip insertion.

NOTE:

(1) Inner holes for external pliers; gutter holes for internal pliers.

Table 1 Type I

Tip Diameter, *T*, +0.002, −0.005	Overall Length, *K*, ±0.5	Jaw Length, *P*, ±0.25	Joint Width, *S*, ±0.188	Handle Span, *W*, ±0.5	Tip Offset Length, Styles B and C, *L*	Rings	
						Basic, Bowed, or Beveled Type	Inverted Type
0.025	5.5	1.88	0.75	1.8	0.31 ± 0.06	0.250*–0.312*	N/A
0.038	5.5	1.88	0.75	1.8	0.31 ± 0.06	0.375*–0.562	0.750–1.000*
0.047	5.5	1.88	0.75	1.8	0.31 ± 0.06	0.625*–1.023	1.062–1.375*
0.070	6.4	2.13	0.875	2.0	0.38 ± 0.06	1.062*–1.750	1.438–2.000*
0.090	8.8	2.50	1.125	2.6	0.50 ± 0.13	1.812*–3.000	2.062–3.000*

GENERAL NOTES:
(a) The *K* and *P* dimensions shown are for Style A (straight tip) configuration.
(b) The asterisk (*) indicates test ring sizes.

Table 2 Type II, Class 1

Tip Diam., *T*, ±0.003	Overall Length, *K*, ±0.13	Shroud Width, *S*, ±0.06	Handle Span, *W*, ±0.13	Shroud Stop Opening, *J*	Bend Length, Styles B and C, *L*, ±0.06	Nominal Shaft Diameter for External Rings, Basic Type or Bowed Type	Test Ring Size [Note (1)]
0.023	5.31	0.5	1.63	0.115 ± 0.005	0.22	0.125	0.125
0.023	5.31	0.5	1.63	0.143 ± 0.003	0.22	0.156	0.156
0.023	5.31	0.5	1.63	0.184 ± 0.004	0.22	0.188–0.236	0.188, 0.236

GENERAL NOTE: The *J* dimension applies to Style A only.
NOTE:
(1) Test ring shall be of beryllium copper.

Table 3 Type II, Classes 2 and 3

Tip Diameter, *T*, +0.002, −0.005	Overall Length, *K*, ±0.5	Jaw Length, *P*, ±0.38	Jaw Width, *S*, ±0.31	Handle Span, *W*, ±0.5	Bend Length, Styles B and C, *L*	Nominal Shaft Diameter for External Rings		Test Ring Sizes	
						Basic, Bowed, or Beveled Type	Inverted Type	Basic, Bowed, or Beveled Type	Inverted Type
0.038	6.0	2.00	0.88	2.5	0.31 ± 0.06	0.250–0.672	0.500–0.781	0.250	0.781
0.047	6.0	2.00	0.88	2.5	0.31 ± 0.06	0.688–0.875	0.812–1.000	0.688	1.000
0.070	6.6	2.38	1.00	2.8	0.41 ± 0.06	0.938–1.438	1.062–2.000	0.938	2.000
0.115	9.0	3.06	1.13	4	0.56 ± 0.13	1.500–3.500	2.125–3.156	1.500	3.156

GENERAL NOTE: The *K* and *P* dimensions shown are for Style A (straight tip) configuration.

标准分享网 www.bzfxw.com 免费下载

Table 4 Type II, Class 4

Tip Diameter, *T*, +0.002, −0.005	Overall Length, *K*, ±0.5	Jaw Length, *P*, ±0.25	Jaw Width, *S*, ±0.19	Handle Span, *W*, ±0.5	Bend Length, Styles B and C, *L*	Nominal Shaft Diam. for External Rings		Test Ring Size	
						Grip Type	Heavy Type	Grip Type	Heavy Type
0.034	5.0	1.06	0.88	2.88	0.31 ± 0.06	0.094	N/A	0.094	N/A
0.040	5.0	1.06	0.88	2.88	0.31 ± 0.06	0.125–0.156	0.394–0.473	0.125	0.473
0.047	5.0	1.06	0.88	2.88	0.31 ± 0.06	0.187–0.250	0.500–0.669	0.187	0.669
0.070	8.8	1.63	0.88	3.88	0.38 ± 0.13	0.313–0.750	0.750–0.984	0.313	0.984

GENERAL NOTE: The *K* and *P* dimensions shown are for Style E (20-deg tip) configuration.

Table 5 Type III, Class 2

Tip Width, *H*, ±0.05	Overall Length, *K*, ±1	Jaw Length, *P*, ±0.750	Jaw Opening, *C*		Maximum Tip Notch Depth, *Q*	Maximum Jaw Height, *F*	Minimum Knurl Length, *G*	Maximum Pivot Height, *J*
			Min.	Max.				
0.055	8	2.5	0.7812	1.75	0.125	0.375	0.375	0.375

GENERAL NOTE: The *C* dimension shall be measured when the handles of the assembled tool are in a fully closed position.

Table 6 Replaceable Tips for Type IV, Class 1, and Type VI

Tip Diameter, *A*	Tip Angle, *B*, deg ±5	Tip Length, *C*	Minimum Length Bent Portion, *D*	Minimum Length Straight Portion, *E*	Nominal Housing Diameter for Internal Rings		Nominal Shaft Diameter for External Rings	
					Basic Type	Inverted Type	Basic Type	Inverted Type
0.039	0	0.059	. . .	1	0.375*–0.438	0.75–1.000*	0.250*–0.469	0.5–0.781*
+0/−0.007	15	+0.01/−0.01	0.25	0.5	0.375*–0.438	0.75–1.000*	0.250*–0.469	0.5–0.781*
	45	+0.01/−0.01	0.25	0.5	0.375*–0.438	0.75–1.000*	0.250*–0.469	0.5–0.781*
	90	+0.01/−0.01	0.25	0.5	0.375*–0.438	0.75–1.000*	0.250*–0.469	0.5–0.781*
0.047	0	0.074	. . .	1	0.453*–0.562	1.062–1.375*	0.500*–0.875	0.812–1.000*
+0/−0.007	15	+0.01/−0.014	0.25	0.5	0.453*–0.562	1.062–1.375*	0.500*–0.875	0.812–1.000*
	45	+0.01/−0.014	0.25	0.5	0.453*–0.562	1.062–1.375*	0.500*–0.875	0.812–1.000*
	90	+0.01/−0.014	0.25	0.5	0.453*–0.562	1.062–1.375*	0.500*–0.875	0.812–1.000*
0.074	0	0.086	. . .	0.875	1.062*–1.75	1.438–2.000*	0.938*–1.438	1.062–2.000*
+0/−0.017	15	+0.022/−0.01	0.25	0.5	1.062*–1.75	1.438–2.000*	0.938*–1.438	1.062–2.000*
	45 [Note (1)]	+0.022/−0.01	0.25	0.5	1.062*–1.75	1.438–2.000*	0.938*–1.438	1.062–2.000*
	90 [Note (1)]	+0.022/−0.01	0.25	0.5	1.062*–1.75	1.438–2.000*	0.938*–1.438	1.062–2.000*

GENERAL NOTES:

(a) The asterisk (*) indicates test ring sizes.

(b) Tips with 15-deg and 45-deg angles exclude radius dimension. Tips with 90-deg angles include radius dimension.

NOTE:

(1) External only.

Table 7 Replaceable Tips for Type IV, Classes 2 and 3, and Type VI

Tip Diam., *A*, +0.002, −0.005	Tip Angle, *B*, deg ±5	Tip Length, *C*, +0.024, −0.010	Minimum Length Bent Portion, *D*	Minimum Length Straight Portion, *E*	Nominal Housing Diam. for Internal Rings, in.		Nominal Shaft Diam. for External Rings, in.	
					Basic Type	Inverted Type	Basic Type	Inverted Type
Tips for Type IV, Class 2 and Type VI: Hex Stock								
0.108	15	0.129	0.32	0.950	2.440*–3.125	2.625–3.000*	1.500*–3.500	2.125–3.346*
0.108	45	0.129	0.44	0.920	2.440–3.125	2.625–3.000*	1.500*–3.500	2.125–3.346*
0.123	45	0.129	0.44	0.920	3.156*–4.000	3.156–4.000*	1.562*–3.750	3.500–3.750*
Tips for Type IV, Class 2: Plate Stock								
0.108	0	0.147	N/A	2.000	2.440*–3.125	2.625–3.000*	1.500*–3.500	2.125–3.346*
0.108	15	0.147	0.44	1.375	2.440*–3.125	2.625–3.000*	1.500*–3.500	2.125–3.346*
0.108	45	0.147	0.44	1.375	2.440*–3.125	2.625–3.000*	1.500*–3.500	2.125–3.346*
0.108	90	0.147	0.44	1.375	2.440*–3.125	2.625–3.000*	1.500*–3.500	2.125–3.346*
0.120	0	0.160	N/A	2.000	3.156*–4.000	3.156–4.000*	1.562*–3.750	3.500–3.750*
0.120	15	0.160	0.44	1.375	3.156*–4.000	3.156–4.000*	1.562*–3.750	3.500–3.750*
0.120	45	0.160	0.44	1.375	3.156*–4.000	3.156–4.000*	1.562*–3.750	3.500–3.750*
0.120	90	0.160	0.44	1.375	3.156*–4.000	3.156–4.000*	1.562*–3.750	3.500–3.750*
Tips for Type IV, Class 3: Plate Stock								
0.120	0	0.230	N/A	2.225	3.062–6.000*	3.156*–4.000*	3.543*–6.500*	3.500*–3.938*
0.120	45	0.230	0.61	1.500	3.062–6.000*	3.156*–4.000*	3.543*–6.500*	3.500*–3.938*
0.120	90	0.230	0.61	1.500	3.062–6.000*	3.156*–4.000*	3.543*–6.500*	3.500*–3.938*
0.150	0	0.230	N/A	2.875	6.250*–10.000*	N/A	N/A	N/A
0.150	45	0.230	1.14	3.000	6.250*–10.000*	N/A	N/A	N/A
0.150	90	0.230	1.14	3.000	6.250*–10.000*	N/A	N/A	N/A
0.170	0	0.230	N/A	3.375	N/A	N/A	6.750*–10.000*	N/A
0.170	45	0.230	1.14	3.625	N/A	N/A	6.750*–10.000*	N/A
0.170	90	0.230	1.14	3.625	N/A	N/A	6.750*–10.000*	N/A

GENERAL NOTE: The asterisk (*) indicates test ring sizes.

标准分享网 www.bzfxw.com 免费下载

Table 8 Type IV, Class 3

Design Type	Dimensions (Less Tips)			To Be Used With Replaceable Tip Diameter (See Table 6)	Nominal Housing or Shaft Diam. for Internal or External Rings	
	Overall Length, *K*, ±0.5	Jaw Length, *P*, ±0.5	Handle Span, *W*, ±0.5		Basic	Inverted
Internal	15	3	3.9	0.12	3.062*–6.000*	3.156*–4.000*
External	15	2.8	4.8	0.12	3.543*–6.500*	3.500*–4.000*
Internal	27	3	6.8	0.15	6.250*–10.000*	N/A
External	17.5	2.8	5	0.17	6.750*–10.000*	N/A

GENERAL NOTES:
(a) The asterisk (*) indicates test ring sizes.
(b) Internal design type dimensions are with pawl in second ratchet notch as shown in Fig. 15.
(c) External design type dimensions in fully closed position.

Table 9 Type V

Internal Position Tip Diam., *T*, +0.002, −0.005	Overall Length, *K*, ±0.50	Jaw Length, *P*, ±0.25	Jaw Width, *S*, ±0.25	Handle Span, *W*, ±0.50	Bend Length, *L*, ±0.06	Housing Diameter for Internal Rings	
						Basic, Bowed, or Beveled Type	Inverted Type
0.038	5.75	1.63	1.19	1.50	0.31	0.375*–0.562	0.750–1.000*
0.047	5.75	1.63	1.19	1.50	0.31	0.626*–1.023	1.062–1.375*
0.070	7.75	1.88	1.44	2.75	0.34	1.062*–1.750	1.438–2.000*
0.090	9.13	2.88	1.75	2.75	0.56	1.812*–3.000	2.062–3.000*
External Position Tip Diam., *T*, +0.002, −0.005	**Overall Length, *K*, ±0.50**	**Jaw Length, *P*, ±0.25**	**Jaw Width, *S*, ±0.25**	**Handle Span, *W*, ±0.50**	**Bend Length, *L*, ±0.06**	**Shaft Diameter for External Rings**	
						Basic, Bowed, or Beveled Type	**Inverted Type**
0.038	5.75	1.63	1.25	2.75	0.31	0.250*–0.672	0.500–0.781*
0.047	5.75	1.63	1.25	2.75	0.31	0.688*–0.875	0.812–1.000*
0.070	7.75	1.88	1.63	3.75	0.34	0.938*–1.438	1.062–2.000*
0.090	9.13	2.88	1.88	4	0.56	1.500*–3.500	2.125–3.250*

GENERAL NOTES:
(a) The *K* and *P* dimensions shown are for Style A (straight tip) configuration.
(b) The asterisk (*) indicates test ring sizes.

Table 10 Type VI

Class	Overall Length, *K*, ±0.5	Jaw Length, *P*, ±0.38	Jaw Width, *S*, ±0.25	Handle Span, *W*, ±0.5	Features
1	6	1.50	1.0	3	With spring
2	7	1.75	1.3	5	With spring and adjustable jaw stop

Table 11 Tip Test Specifications

Nominal Tip Diameter	Tip Restraint Block Hole Size, +0.010, −0.000	Min. Tip Load, *L*, lbf
0.023	0.031	20
0.025	0.031	28
0.034	0.052	60
0.038	0.052	69
0.039	0.052	71
0.040	0.052	73
0.047	0.052	83
0.070	0.098	124
0.074	0.098	130
0.087	0.098	154
0.090	0.098	159
0.108	0.166	174
0.115	0.166	204
0.116	0.166	204
0.120	0.166	212
0.123	0.166	220
0.150	0.166	265

标准分享网 www.bzfxw.com 免费下载

ASME B107.20

PLIERS: LINEMAN'S, IRON WORKER'S, GAS, GLASS, FENCE, AND BATTERY

1 SCOPE

This Standard provides performance and safety requirements for pliers having gripping surfaces and/or cutting edges. Inclusion of dimensional data in this Standard does not mean that all products described herein are stock production sizes. Consumers should consult with manufacturers concerning a list 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 covered tools.

2 DEFINITIONS

button cutter: cutter located on the joint of Types IV and VII pliers for cutting wire.

crusher: parallel flat areas on the inside handle surfaces near the pivot, designed for crushing.

tape-pulling area: gap between handle and joint.

3 REFERENCE

The following publication is referenced in this Standard.

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

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

4 CLASSIFICATIONS

Type I: lineman's
- *Class 1:* square head
- *Class 2:* round head
- *Class 3:* square head with wire stripper

Type II: discontinued (designation retained for continuity with B107.20M-1998)
- *Class 1:* square head
- *Class 2:* round head
- *Class 3:* square head with wire stripper

Type III: iron worker's
- *Class 1:* square head
- *Class 2:* round head

Type IV: combination jaw

Type V: gas

Type VI: glass

Type VII: fence

Type VIII: battery

5 PERFORMANCE REQUIREMENTS

The illustrations herein are descriptive and not restrictive and are not intended to preclude the manufacture of pliers that are otherwise in accordance with this Standard. All figures are shown without comfort grips or springs.

5.1 Design

Pliers shall be similar to the figure to which reference is made and shall be proportioned in all parts so as to be strong, durable, and easy to operate. Pliers shall pass applicable tests without cracking or breaking.

5.1.1 Type I, Lineman's. Jaws shall have cutting edges on one side near the joint end. The cutting edges shall extend approximately one-half the length of the jaws. The remaining portions of the jaws shall have straight surfaces, scored with a straight or uniform diamond-shaped pattern. There shall be a recess in the jaws behind the side cutter to provide satisfactory cutting clearance. The crusher surfaces may be smooth or scored. With the pliers closed, the ends of the jaws shall not touch but shall have a maximum gap of 0.025 in. on nominal size 6-in. and 7-in. pliers and 0.040 in. on nominal size 8-in. and 9-in. pliers (refer to dimension G on Figs. 1 through 5).

5.1.1.1 Class 1, Lineman's, Square Head. Pliers shall have square heads and shall be similar to Fig. 1. They shall conform to dimensions shown in Fig. 1 and Table 1.

5.1.1.2 Class 2, Lineman's, Round Head. Pliers shall have round heads and shall be similar to Fig. 2. They shall conform to dimensions shown in Fig. 2 and Table 1.

标准分享网 www.bzfxw.com 免费下载

5.1.1.3 Class 3, Lineman's, Square Head With Wire Stripper. Pliers shall have square heads and two insulation stripping holes in the cutting edges; they shall be similar to Fig. 3. They shall conform to dimensions shown in Fig. 3 and Table 1.

5.1.2 Type III, Iron Worker's. Pliers' jaws shall have cutting edges on one side near the joint end. The cutting edges shall extend up to a recess in the jaws behind the side cutter to provide satisfactory cutting clearance. The remaining portion of the jaws shall have scored surfaces. The crusher surfaces may be smooth or scored. With the pliers closed, the ends of the jaws shall not touch but shall leave a clearance that will permit gripping 0.025-in. wire firmly on nominal size 6-in. and 7-in. pliers and 0.040-in. wire firmly on nominal size 8-in. and 9-in. pliers (refer to dimension *G* on appropriate figures). One handle end shall be bent to prevent the pliers from slipping through the hand during normal usage. Pliers may be supplied with a spring.

5.1.2.1 Class 1, Iron Worker's, Square Head. Pliers shall be similar to Fig. 4 and shall conform to dimensions shown in Fig. 4 and Table 1.

5.1.2.2 Class 2, Iron Worker's, Round Head. Pliers shall be similar to Fig. 5 and shall conform to dimensions shown in Fig. 5 and Table 1.

5.1.3 Type IV, Combination Jaw. Pliers shall conform to the requirements shown in Table 2 and shall be similar to Fig. 6. Pliers shall have combination jaws and at least two wire cutters. Pliers shall be of flat-nose construction. Combination jaws shall have straight scored gripping surfaces at the outer end and curved scored gripping surfaces closer to the joint. Curved surfaces shall grip a 0.25-in. diameter rod on nominal size 8-in. pliers and 0.31-in. diameter rod on nominal size $10\frac{1}{2}$-in. pliers when the outermost end of the jaws is opened not more than 0.10 in. The crusher surfaces may be smooth or scored.

5.1.4 Type V, Gas. Pliers shall conform to the requirements shown in Table 3 and shall be similar to Fig. 7. Jaws shall be of uniform width, and the outer end or nose shall be rounded. The pliers shall have a central longitudinal grip at the outer end of the jaw and two elliptical transverse grips in the jaw body. The gripping surfaces shall have sharp pointed teeth. The longitudinal grip shall be suitable for gripping both flat and round objects. With the outermost ends of the jaws opened not more than 0.18 in., the smaller transverse grip shall securely hold a 0.34-in. diameter rod, and the larger transverse grip shall securely hold a 0.44-in. diameter rod, individually. The larger transverse grip shall have a capacity for holding a rod of at least 1.50-in. diameter.

5.1.5 Type VI, Glass. Type VI pliers shall conform to the requirements shown in Table 4 and shall be similar to Fig. 8. Pliers shall be suitable for firmly grasping plate glass along the full width of the jaw. With the pliers in a closed position, the jaws shall contact each other only at their outermost end. With the jaws of the pliers opened so that the jaw surfaces are parallel, the jaw opening shall be not less than 0.44 in. and not more than 0.50 in. The gripping surfaces of the jaws shall be smooth and without scoring.

5.1.6 Type VII, Fence. Type VII pliers shall conform to the requirements shown in Table 5 and shall be similar to Fig. 9. Pliers shall be suitable for maintaining and installing wire fence on metal or wood posts. Pliers shall have a hammer head on one jaw and a starting-and-pulling point on the other. Pliers shall be provided with two side wire cutters and two transverse holes in the jaws for twisting and splicing wire. The crusher shall be scored.

5.1.7 Type VIII, Battery. Pliers shall conform to the requirements shown in Table 6 and shall be similar to Fig. 10. Gripping surfaces shall be deeply scored the full length of the jaws. Jaws shall open and close in a uniform manner. Jaws shall be offset 15 deg to 40 deg as measured from the centerline of the jaws and the centerline of the handles. With the pliers gripping a 0.62-in. diameter rod, the maximum distance between the outsides of the handles at the gripping portion shall not exceed 4 in. (Pliers with a multi-position slip joint that otherwise meet the preceding requirements are a suitable alternative.)

5.2 Materials

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

5.3 Finish

Metallic surfaces shall have a rust preventive treatment and be free from pits, nodules, burrs, cracks, and other conditions that would adversely affect the performance or safe use of the pliers. When provided, coatings shall be adherent and free from any condition that would interfere with the pliers' 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 may be readily determined. The marking shall be as permanent as the normal life expectancy of the pliers to which it is applied (provided the surface to which it was applied 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 Cutting

Pliers with cutting edges shall cut wire per para. 6.1.1. Following the wire cut test, pliers, except Types IV and VII (which have no paper cut requirements), shall cut paper per para. 6.1.2.

5.6 Handles

5.6.1 Characteristics. Handles shall be shaped to afford a comfortable grip. Handle surfaces shall be free from rough edges and sharp corners. Handles shall not contact each other when jaws are in a closed position. Hand gripping surfaces shall be smooth, knurled, impressed, or furnished with comfort grips. Handles shall be hardened to 35 HRC to 50 HRC.

5.6.2 Set. A permanent set of the handles for all types shall not exceed the amount specified in Table 7 for the individual types and sizes of pliers when subjected to the handle load test specified in para. 6.3.

5.6.3 Comfort Grips. When comfort grips are furnished, they shall be made of a polymer of rubber, plastic, or other suitable material capable of withstanding long, hard usage without deteriorating or rubbing off, and shall pass the solvent resistance test specified in para. 6.4. Comfort grips shall remain permanently attached under normal use. Unless specifically designed, labeled, and tested for such use, tools with comfort grips shall not be advertised or marked as having any nonconductive or electrically insulating properties.

5.7 Joint

Pliers shall be joined in a permanent manner with a fastener. The joint shall ensure uniform smooth movement with minimal looseness and sideplay when opening the jaw as specified in para. 5.8.1 and shall not loosen or require adjustment. Fastener hardness shall be from 25 HRC to 50 HRC, except when casehardened, when a maximum hardness equivalent to 60 HRC shall be permitted.

5.8 Jaws

5.8.1 Jaw Opening. The end of the jaws shall open to the respective minimum jaw opening specified in the applicable tables for the individual types and sizes of pliers. It shall be possible to open the jaws to the minimum jaw opening by the application of a force to the handles of the magnitude specified and in the manner specified in para. 6.5. Beyond the minimum jaw opening, the jaws may be opened at increased loads until the positive stop of the tool is engaged.

5.8.2 Jaw Hardness. The jaw area shall have a hardness of 35 HRC to 65 HRC. On pliers with cutting edges, the jaw hardness, within 0.062 in. of the cutting edge, shall have a hardness from 55 HRC to 65 HRC. On Types IV and VII pliers, the button cutters shall have a hardness from 45 HRC to 65 HRC.

5.9 Springs

When a spring (or springs) is furnished, it shall be capable of opening the pliers' jaws to the minimum jaw opening as specified in the applicable tables for the individual types and sizes of pliers.

6 TESTS

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

6.1 Cut Test

6.1.1 Steel Wire Cut Test. Pliers shall cut steel wire specified in Table 8. Three cuts shall be made at the joint end of the cutting edges and shall not exceed the applicable test loads in Table 8 for individual types and sizes of pliers. The wire cut test shall be conducted in accordance with ASME B107.25, para. 4.2.1.

6.1.2 Paper Cut Test. The paper cut test shall be conducted in accordance with ASME B107.25, para. 4.2.2.

6.2 Hardness Test

Hardness shall be tested in accordance with ASME B107.25, para. 4.3.

6.3 Handle Load Test

The handle load test shall be conducted in accordance with ASME B107.25, para. 4.1. Pliers shall be tested without comfort grips. Load shall be applied at the point of maximum handle curvature (normal gripping position). The outermost end of the jaws shall grip approximately 0.13 in. of a steel insert of thickness specified in Table 7. A permanent set of the handles shall not exceed the applicable values in Table 7.

6.4 Solvent Resistance Test

The solvent resistance test shall be conducted in accordance with ASME B107.25, para. 4.5.

6.5 Jaw Opening Test

The jaw opening test shall be conducted in accordance with ASME B107.25, para. 4.4.2. The force required to open the jaws shall not be greater than 3 lbf for all pliers.

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*.

标准分享网 www.bzfxw.com 免费下载

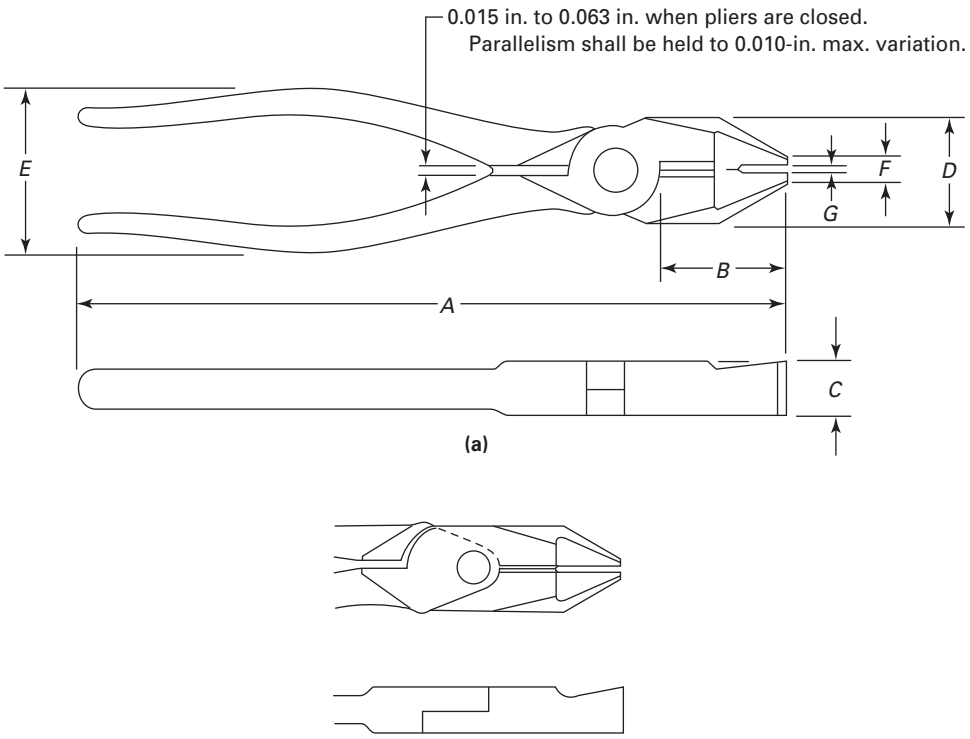
8 DESIGNATIONS

Purchasers should select the options permitted herein and include the following information in procurement documents:

(a) type and class of pliers required
(b) nominal size of pliers required
(c) when comfort grips are required
(d) when springs are required

EXAMPLE: Lineman's pliers, Type I, Class 3, 8 in., no comfort grips, no springs.

Fig. 1 Type I, Class 1, Lineman's, Square Head



标准分享网 www.bzfxw.com 免费下载

Fig. 2 Type I, Class 2, Lineman's, Round Head

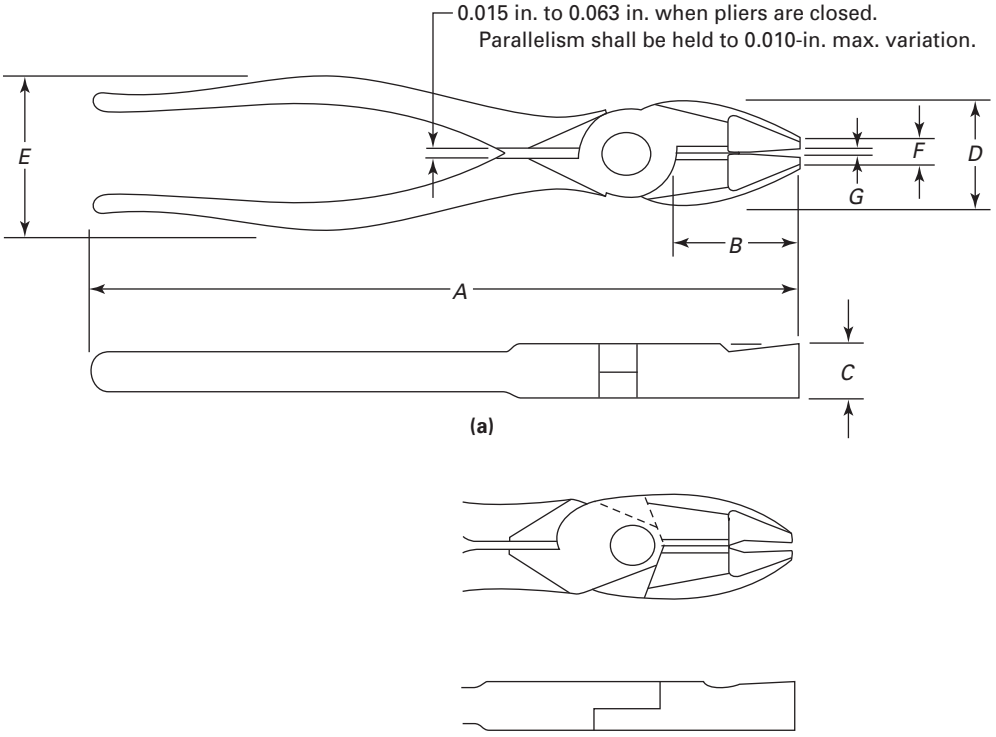
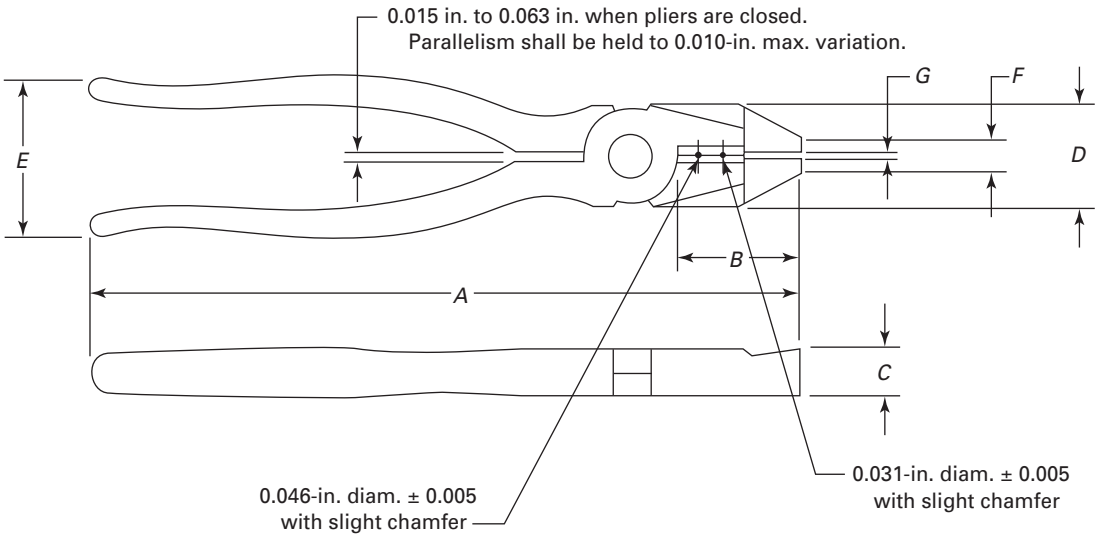
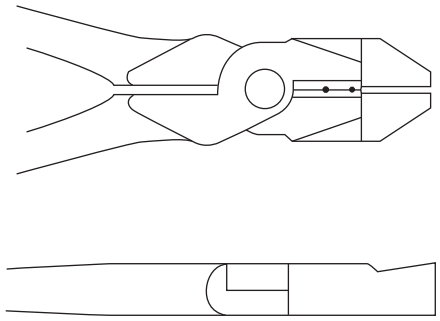


Fig. 3 Type I, Class 3, Lineman's, Square Head With Wire Stripper



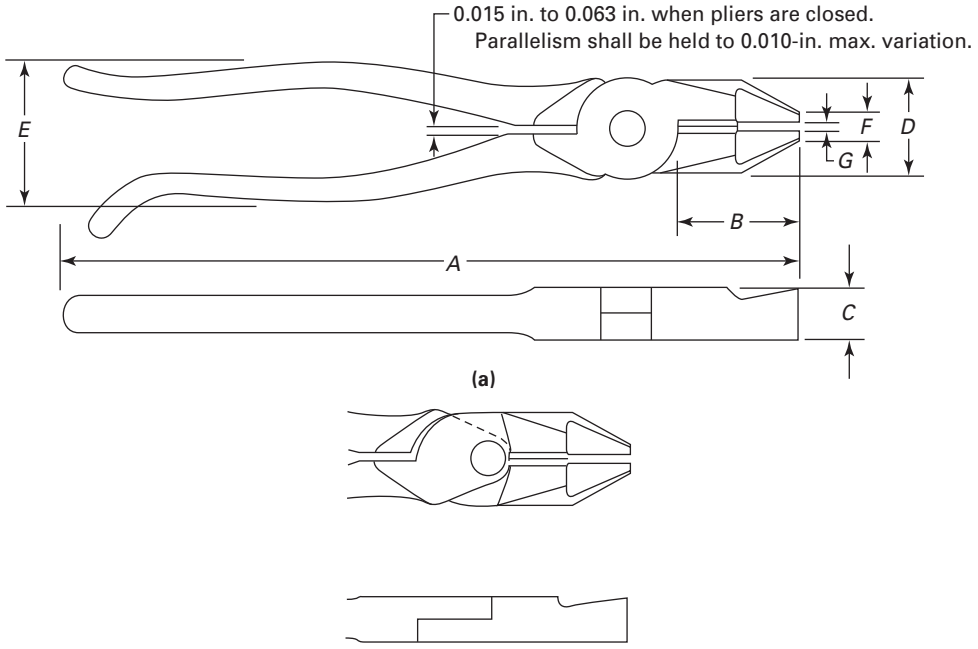
(a)



(b) Alternate Head Design

标准分享网 www.bzfxw.com 免费下载

Fig. 4 Type III, Class 1, Iron Worker's, Square Head



(a)

(b) Alternate Head Design

Fig. 5 Type III, Class 2, Iron Worker's, Round Head

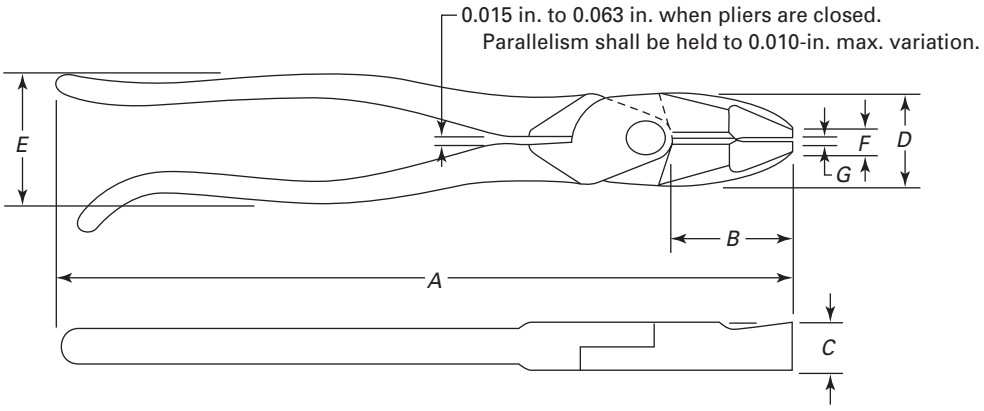


Fig. 6 Type IV, Combination Jaw

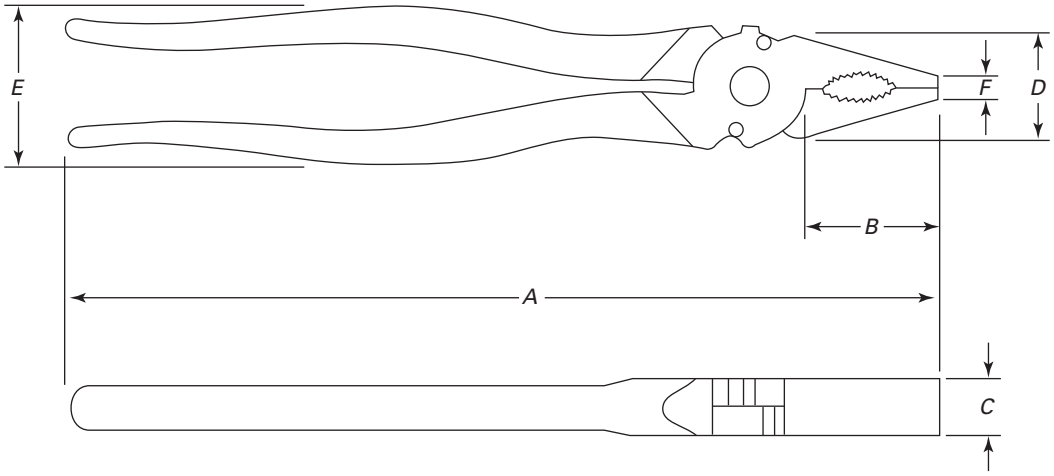
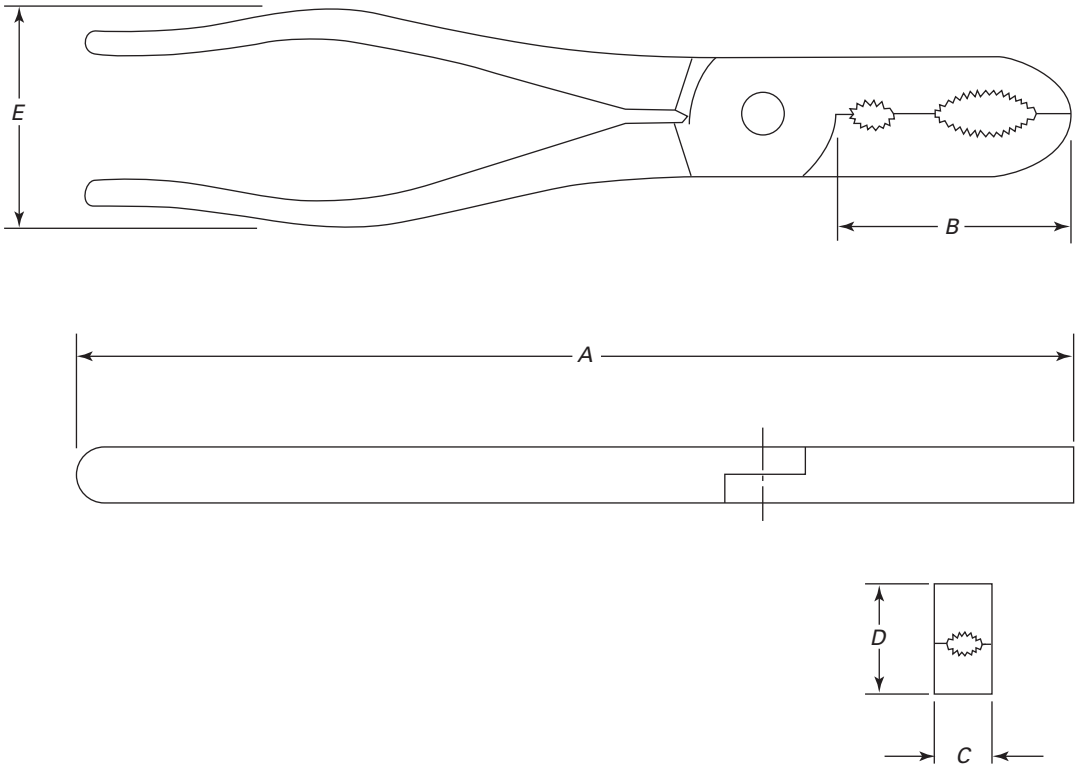


Fig. 7 Type V, Gas



标准分享网 www.bzfxw.com 免费下载

Fig. 8 Type VI, Glass

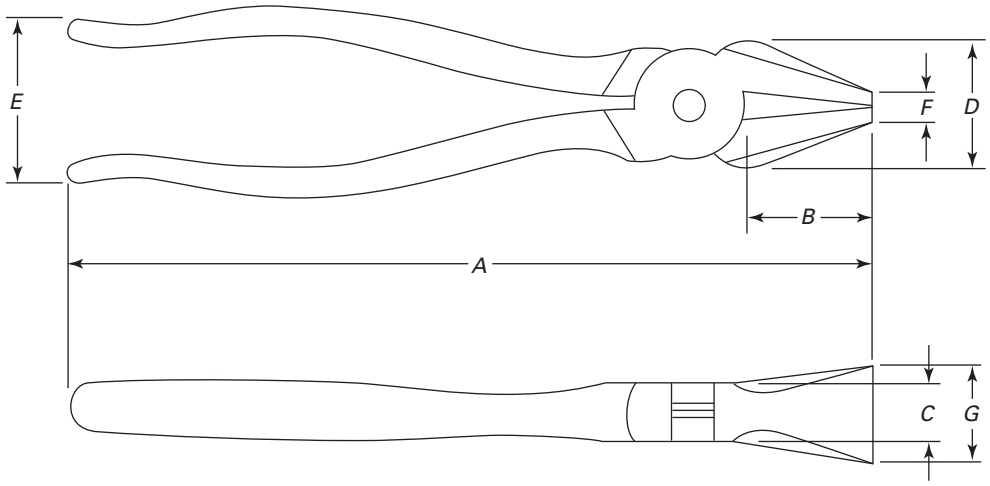
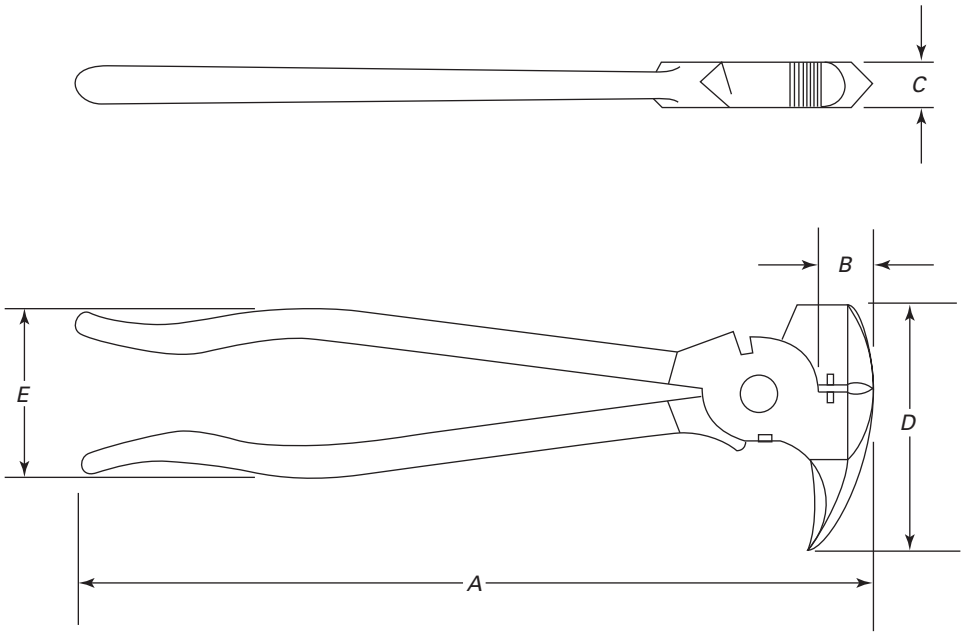
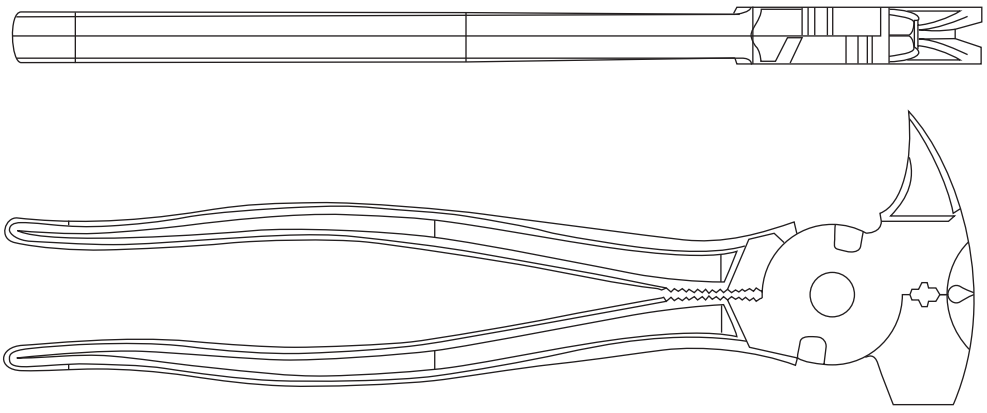


Fig. 9 Type VII, Fence



(a)



(b) Alternate Head Design

标准分享网 www.bzfxw.com 免费下载

Fig. 10 Type VIII, Battery

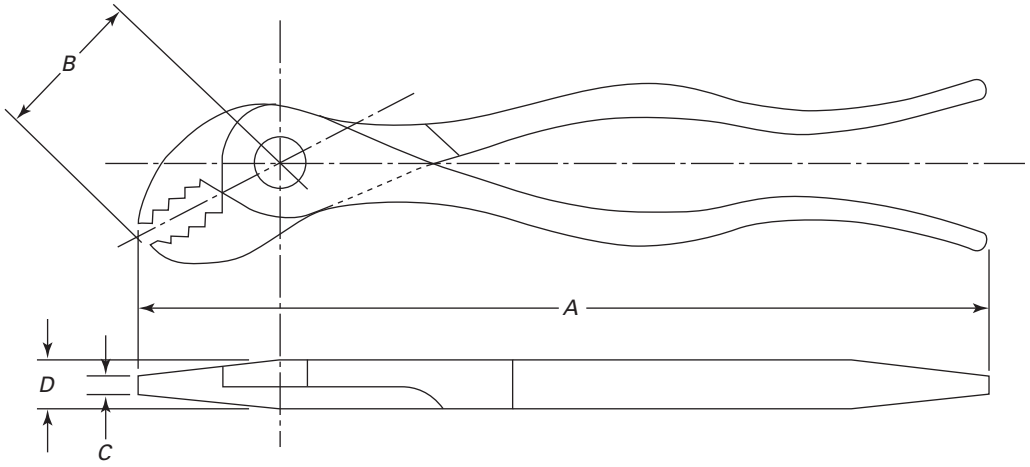


Table 1 Types I and III, Lineman's and Iron Worker's

Nominal Size, in.	Overall Length, *A*, ±0.50 in.	Jaw Length, *B*, ±0.25 in.	Joint Thickness, *C*, ±0.13 in.	Jaw Width, *D*, +0.18 in., −0.12 in.	Handle Span *E*, ±0.25 in.	Nose Width, *F*, ±0.062 in.	Min. Jaw Opening, in.
6	6.50	1.25	0.50	0.88	1.75	0.219	0.625
7	7.50	1.25	0.50	0.97	1.75	0.219	0.625
8	8.50	1.50	0.62	1.28	1.88	0.281	0.875
9	9.50	1.56	0.63	1.28	1.88	0.281	0.875

GENERAL NOTE: The *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 2 Type IV, Combination Jaw

Nominal Size, in.	Overall Length, *A*, ±0.50 in.	Jaw Length, *B*, ±0.25 in.	Joint Thickness, *C*, ±0.125 in.	Jaw Width, *D*, ±0.19 in.	Handle Span, *E*, ±0.25 in.	Nose Width, *F*, +0.19 in., −0.07 in.	Min. Jaw Opening, in.
8	8.00	1.38	0.625	1.19	1.88	0.25	0.875
$10\frac{1}{2}$	10.50	1.50	0.625	1.38	1.94	0.31	0.875

GENERAL NOTE: The *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 3 Types V, Gas

Nominal Size, in.	Overall Length, *A*, ±0.50 in.	Jaw Length, *B*, ±0.25 in.	Joint Thickness, *C*, ±0.062 in.	Jaw Width, *D*, ±0.125 in.	Handle Span, *E*, ±0.375 in.	Min. Jaw Opening, in.
$6\frac{1}{2}$	6.50	1.06	0.312	0.812	1.875	0.875
$8\frac{1}{2}$	8.50	2.00	0.437	1.062	1.750	1.375
10	10.00	2.13	0.625	1.187	1.500	1.375

GENERAL NOTE: The *A* and *E* dimension in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 4 Type VI, Glass

Nominal Size, in.	Overall Length, *A*, ±0.50 in.	Jaw Length, *B*, ±0.25 in.	Joint Thickness, *C*, ±0.13 in.	Jaw Width, *D*, ±0.13 in.	Handle Span, *E*, ±0.25 in.	Nose Thickness, *F*, ±0.38 in.	Nose Width, *G*, ±0.25 in.	Min. Jaw Opening, in.
7	7.00	1.13	0.50	1.13	1.88	0.25	0.88	1
8	8.00	1.38	0.50	1.25	1.88	0.31	0.88	1

GENERAL NOTE: The *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 5 Type VII, Fence

Nominal Size, in.	Overall Length, *A*, ±0.50 in.	Jaw Length, *B*, ±0.25 in.	Joint Thickness, *C*, ±0.06 in.	Head Width, *D*, ±0.50 in.	Handle Span, *E*, ±0.25 in.
10	10.38	0.75	0.56	3.25	2.00

GENERAL NOTE: The *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 6 Type VIII, Battery

Nominal Size, in.	Overall Length, *A*, ±0.50 in.	Jaw Length, *B*, ±0.25 in.	Jaw Tip Thickness, *C*, ±0.06 in.	Joint Thickness, *D*, ±0.13 in.	Min. Jaw Opening, in.
7	7.50	1.38	0.22	0.38	0.63

GENERAL NOTE: The *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in.

Table 7 Allowable Permanent Set for Pliers

Nominal Size		Test Load, lbf-in.	Maximum Pemanent Set, in.	Insert Thickness, ±0.010 in.
Type	in.			
I and III	6	600	0.03	0.125
	7	600	0.03	0.125
	8	1,020	0.06	0.125
	9	1,020	0.06	0.125
IV	8	1,275	0.06	0.125
	$10\frac{1}{2}$	1,825	0.06	0.125
				Diameter, in.
V	6	800	0.06	0.500
	8	1,020	0.06	0.750
	10	1,400	0.06	1.000
VI	8	750	0.13	0.437
VII	10	1.275	0.06	0.125
VIII	7	200	0.13	0.500

Table 8 Steel Wire Sizes and Test Loads for Wire Cut Test

Nominal Size			Wire Diameter, ±0.002 in.	Wire Tensile Strength Minimum, ksi	Maximum Test Loads, lbf-in.
Type	in.	Number of Cuts			
I and III	6	3	0.080	180	600
	7	3	0.080	180	875
	8	3	0.091	180	1,020
	9	3	0.091	180	1,020
IV	8	3	0.080	180	500
	$10\frac{1}{2}$	3	0.091	180	500
VII	10	3	0.091	120	1,275

标准分享网 www.bzfxw.com 免费下载

ASME B107.22

ELECTRONIC CUTTERS AND PLIERS

1 SCOPE

This Standard provides performance and safety requirements for cutters and pliers less than 6 in. long, equipped with a spring, typically used in the manufacture of electronic equipment. Inclusion of dimensional data in this Standard does not mean that all the products described herein are stock production sizes. Consumers should consult with manufacturers concerning a list of stock production sizes.

This Standard may be used as a guide by state authorities and 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 DEFINITIONS

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

3 REFERENCES

The following publications are referenced in this Standard. The latest edition shall be used.

ASTM E 18, Standard Test Methods for Rockwell Hardness of Metallic Materials

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: The Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591 (www.hti.org)

4 CLASSIFICATIONS

Type I: cutters
- *Class 1:* diagonal
  - Style A: oval head
  - Style B: relieved oval head
  - Style C: tapered head
- *Class 2:* offset nippers (oblique)
- *Class 3:* transverse cutters (end)
- *Class 4:* end cutters (angle)

NOTE: Type I cutters shall be available with one of the following cutting designs: Design A — Standard Cutting Edges, Design B — Semiflush Cutting Edges, or Design C — Flush Cutting Edges.

Type II: pliers
- *Class 1:* flat nose
- *Class 2:* chain nose
  - Style A: long nose without side cutter
  - Style B: long nose with side cutter
  - Style C: curved nose
  - Style D: short nose
  - Style E: subminiature
- *Class 3:* long nose with tip cutter
- *Class 4:* needle nose
- *Class 5:* round nose

NOTE: Type II pliers shall be available with one of the following jaw designs: Design A — Smooth Jaw or Design B — Serrated Jaw.

5 PERFORMANCE REQUIREMENTS

The illustrations shown herein are descriptive, not restrictive, and are not intended to preclude the manufacture of cutters or pliers that are otherwise in accordance with this Standard. All figures are shown without comfort grips or springs. Cutters and pliers shall pass the applicable tests in para. 6.

5.1 Design

Cutters and pliers shall be similar to those depicted in the referenced figures and shall be proportioned in all parts to be strong, durable, and easy to operate. Cutters and pliers shall withstand applicable test procedures without cracking or breaking. Cutting edges shall be so designed as to produce one of the severed wire profiles illustrated in Fig. 1 using wire specified in Table 1.

5.1.1 Type I, Class 1, Diagonal

5.1.1.1 Style A — Oval Head. Cutting edges shall have an angle of 15 deg ± 5 deg from the plane of the handles. One side of the jaw shall be recessed to provide a suitable cutting edge clearance. The cutters shall be similar to Fig. 2 and shall conform to dimensions in Table 2. Cutters may have a wire holding device or other means to capture the cut wire.

5.1.1.2 Style B — Relieved Oval Head. Cutting edges shall have an angle of 15 deg ± 5 deg from the plane of the handles. One side of the jaw shall be relieved to permit cutting in limited access areas. Cutters shall be similar to Fig. 3 and shall conform to dimensions in Table 3.

标准分享网 www.bzfxw.com 免费下载

5.1.1.3 Style C — Tapered Head. Cutters have a tapered head that improves visibility for cutting in confined areas where accessibility is limited. Cutters shall be similar to Fig. 4 and conform to dimensions in Table 4.

5.1.2 Type I, Class 2, Offset Nippers (Oblique). Cutters shall have an angled cutting edge that is used when space or angle of wire prohibits the use of other cutters. Cutters shall be similar to Fig. 5 and conform to dimensions in Table 5.

5.1.3 Type I, Class 3, Transverse Cutters (End). Jaws shall taper uniformly from near the joint to the outermost end. Cutters shall be similar to Fig. 6 and conform to dimensions in Table 6.

5.1.4 Type I, Class 4, End Cutters (Angle). Cutters have an angled cutting edge on the end of the nose. Jaws are relieved and tapered uniformly from near the joint to the outermost end. Cutters shall be similar to Fig. 7 and conform to dimensions in Table 7.

5.1.5 Type II, Class 1, Flat Nose. Pliers shall be suitable for manipulating and pulling small objects, reaching into small openings, gripping and holding flat or square objects securely, and making angular bends and similar forming operations. The jaws shall taper in thickness from near the joint to the outermost end. Jaws shall contact each other at the outermost end when the pliers are in a closed position. Pliers shall be similar to Fig. 8 and conform to dimensions shown in Table 8.

5.1.6 Type II, Class 2, Chain Nose

5.1.6.1 Type II, Class 2, Style A — Long Nose Without Side Cutter. Pliers shall be suitable for making bends, loops, and similar forming operations on wire and sheet metal and for gripping, manipulating, pulling objects, and reaching into small openings. The inside and outside surfaces of the jaws shall taper uniformly from the joint area to the tips. Tips shall contact each other at the outermost end when the pliers are in a closed position. Jaw tips shall be half-elliptical and shaped so that the gripping surfaces are planar and straight. Pliers shall be similar to Fig. 9 and conform to dimensions shown in Table 9.

5.1.6.2 Class 2, Style B — Long Nose With Side Cutter. In addition to the requirements of Type II, Class 2, Style A, the jaws of the pliers shall be provided with cutting edges, adjacent to the joint. There shall be a recess behind the cutters to provide clearance for the cutting edges. With the pliers in the closed position, the cutting edges shall contact each other throughout their entire length. Pliers shall be similar to Fig. 10 and conform to dimensions shown in Table 10.

5.1.6.3 Class 2, Style C — Curved Nose. Pliers' jaws are curved for easier access in confined places. Pliers shall be suitable for gripping, manipulating, pulling objects, and reaching into small openings. The inside and outside surfaces of the jaws shall taper uniformly from the joint area to the tips. Tips shall contact each other at the outermost end when the pliers are in a closed position. Jaw tips shall be half-elliptical in shape so that the gripping surfaces are planar and straight. Pliers shall be similar to Fig. 11 and conform to dimensions shown in Table 11.

5.1.6.4 Class 2, Style D — Short Nose. Pliers shall be suitable for fine, close work in making bends, loops, and similar forming operations on wire and sheet metal and for gripping, manipulating, pulling objects, and reaching into small openings. The inside and outside surfaces of the jaws shall taper uniformly from the joint area to the tips. Tips shall contact each other at the outermost end when the pliers are in a closed position. Jaw tips shall be half-elliptical in shape so that the gripping surfaces are planar and straight. Pliers shall be similar to Fig. 12 and conform to dimensions in Table 12.

5.1.6.5 Class 2, Style E — Subminiature. Pliers shall have a fine point and be suitable for delicate work in making bends, loops, and similar forming operations on small wire and for gripping, manipulating, and pulling objects in very confined places. The inside and outside surfaces of the jaws shall taper uniformly from the joint area to the tips. Tips shall contact each other at the outermost end when the pliers are in a closed position. Jaw tips shall be half-elliptical in shape so that the gripping surfaces are planar and straight. Pliers shall be similar to Fig. 13 and conform to dimensions in Table 13.

5.1.7 Type II, Class 3, Long Nose With Tip Cutter. Pliers shall have a cutting edge and be suitable for making some bends or loops on wire and for gripping, manipulating, or pulling small objects and reaching into small openings. The inside and outside surfaces of the jaws shall taper uniformly from the joint area to the tips. Tips shall contact each other at the outermost end when the pliers are in the closed position. Jaw tips shall be half-elliptical in shape so that the gripping surfaces are planar and straight. Pliers shall be similar to Fig. 14 and conform to dimensions in Table 14.

5.1.8 Type II, Class 4, Needle Nose. Pliers shall be suitable for assembly work in hard-to-reach areas. Outside surfaces of the jaws shall have a reduced cross-sectional area immediately after the joint and taper uniformly to the jaw tips. Inside surfaces of the jaws shall taper uniformly from the joint area to the tips. Jaw edges shall be radiused to prevent nicking and marring. Tips shall be half-elliptical in shape so that the gripping surfaces are planar and straight. Pliers shall be similar to Fig. 15 and conform to dimensions in Table 15.

5.1.9 Type II, Class 5, Round Nose. Pliers shall be suitable for bending and shaping wire. The jaws are round in cross section so that the gripping surfaces are circular. The inside and outside surfaces of the jaws shall

taper uniformly from the joint area to the tips. Tips shall contact each other at the outermost end when the pliers are in a closed position and have a maximum gap of 0.03 in. at the joint. Pliers shall be similar to Fig. 16 and shall conform to dimensions shown in Table 16.

5.2 Materials

The materials used in the manufacture of cutters and pliers shall be such as to produce pliers conforming to the requirements specified in this Standard.

5.3 Handles

5.3.1 Characteristics. Handles shall be so shaped to afford a comfortable grip and be free from rough edges and sharp corners to prevent injury to the hand. Handles shall have a hardness of 35 HRC to 60 HRC or equivalent. Ends of handles shall not touch when the jaws are in the closed position. Hand gripping surfaces shall be smooth, knurled, impressed, or furnished with comfort grips.

5.3.2 Comfort Grips. Comfort grips shall be made of rubber, plastic, or other suitable material capable of withstanding normal use without deteriorating or rubbing off and shall pass the solvent resistance test as specified in para. 6.5. The comfort grips shall remain permanently attached under normal use of the tool. The ends of the handles shall not touch when the jaws are in the closed position.

Unless specifically designed, labeled, and tested for such use, tools with comfort grips shall not be advertised or marked as having any nonconductive or electrically insulating properties.

5.4 Joints

Joints shall pass the test specified in para. 6.2. Fastener hardness shall be from 25 HRC to 50 HRC except when the fastener receives a case-hardening treatment in addition to through hardening, where a maximum hardness equivalent to 60 HRC shall be permitted.

5.5 Jaws

5.5.1 Jaw Opening. The ends of the jaws shall open to the respective minimum distance as specified for the individual types and classes of pliers. Jaw opening distance shall be measured at the tips of the jaws. Beyond the minimum opening in the applicable tables, the jaws may open at increasing loads until the positive stop is engaged.

5.5.2 Jaw Hardness. Cutting edges (within 0.06 in. of the cutting edge shoulder) shall have a hardness equivalent to 55 HRC to 65 HRC and pass the cut tests in para. 6.3. The balance of the jaw shall have a minimum hardness of 35 HRC.

5.5.3 Smooth Jaws. Pliers with smooth jaws (Type II, Design A) shall have a minimum gripping surface length of 0.25 in. from the outermost end of the jaw and shall be chamfered or radiused to prevent marring or nicking of the material being held.

5.5.4 Serrated Jaws. Pliers with scored jaws (Type II, Design B), except Class 3, long nose with tip cutter, shall have 0.25 in. to 0.50 in. of the gripping surface scored back from the outermost end of the jaw. Class 3 pliers shall have serrations within 0.032 in. of the cutting edge from the outermost edge.

5.6 Springs

All cutters and pliers shall have a spring. The spring shall be captive, durable, and capable of opening the jaws under normal use. The spring shall open the jaws to the minimum jaw opening distance, as indicated in the appropriate tables, for the normal life of the tool.

5.7 Finish

Metallic surfaces shall have a rust preventive treatment and be free from pits, nodules, burrs, cracks, and other conditions that adversely affect the performance or safety of the pliers. When provided, coatings shall be adherent and free from any condition that interferes with their protective value, safety, and function.

5.8 Marking

Cutters and 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 manufacturer can be readily determined. Marking shall be as permanent as the normal life expectancy of the cutters or pliers to which it is applied (providing the surface has not been subjected to a fretting or abrading action) and capable of withstanding cleaning normally experienced during its intended use.

6 TESTS

WARNING: Many tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be employed in conducting these tests. These tests are designed to evaluate the tools and materials and do not condone the use of the tools in an environment, or in a manner, inconsistent with safe use of the tools.

6.1 Handle Load Test

6.1.1 Procedure. Permanent set and deflection shall be tested per ASME B107.25, para. 4.1. Load shall be applied at the point of maximum handle curvature. Cutters and pliers shall be tested with a hardened jaw insert placed between the cutting edges or jaw tips. The insert shall be approximately 0.06 in. thick. For Type I cutters, the insert may be tapered if required so that the cutting edges are completely in contact with the insert when the handle load is applied. For Type II pliers, the insert shall not extend in the jaw more than 0.13 in. from the

标准分享网 www.bzfxw.com 免费下载

outermost end of the jaw. The insert shall be hardened to not less than 40 HRC.

6.1.2 Permanent Set and Deflection. Permanent set on all cutters and pliers shall not exceed 0.04 in. when subjected to a major load to create a 100-lbf-in. moment. Deflection on all cutters and pliers less than 5 in. in nominal length shall not exceed 0.50 in. Deflection on all cutters and pliers 5 in. in nominal length or longer shall not exceed 0.75 in. If permanent set or deflection exceeds the maximum values specified; if the handles or jaws break, crack, or chip; or if the fastener shows signs of weakness, the cutters or pliers shall have failed the test.

6.2 Joint Integrity Test

Cutters and pliers shall be tested per ASME B107.25 using a minimum load of 1.0 lbf. Deflection shall not exceed 0.01 in. per inch from the pivot to the end of the handle.

6.3 Cut Tests

Cut tests shall be performed per ASME B107.25 on all cutters and pliers with cutting edges. Load shall be applied at the point of maximum handle curvature (normal gripping position).

6.3.1 Paper Cut Test. Prior to the wire cut test, the paper cut test shall be performed.

6.3.2 Wire Cut Test. Wire for cut tests shall be as specified in Table 1. Three cuts shall be made at the midpoint of the cutting edges. In addition, for all except Type II, Class 3, three cuts shall be made at the end of the cutting edge farthest from the joint so that a total of six cuts shall be made. The load required to completely sever the wire at cutting edge midpoint shall not exceed the maximum moment specified in Table 1. There shall be no visible deformation or damage to the cutting edges as a result of this test.

6.3.3 Paper Cut Test. Following the wire cut test, the paper cut test shall be performed. Cutting performance shall be comparable with the previous paper cut test results.

6.4 Hardness Tests

Hardness specified herein shall be tested in accordance with ASTM E 18. Hardness values pertain to the substrate material of the cutters and pliers. Handle hardness determination shall be taken approximately midway between the joint fastener and the end of each handle.

6.5 Comfort Grip Solvent Resistance Test

Comfort grips shall be tested per the solvent resistance test in ASME B107.25.

7 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

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

Fig. 1 Severed Wire Designs With Cutting Edges Cross Section

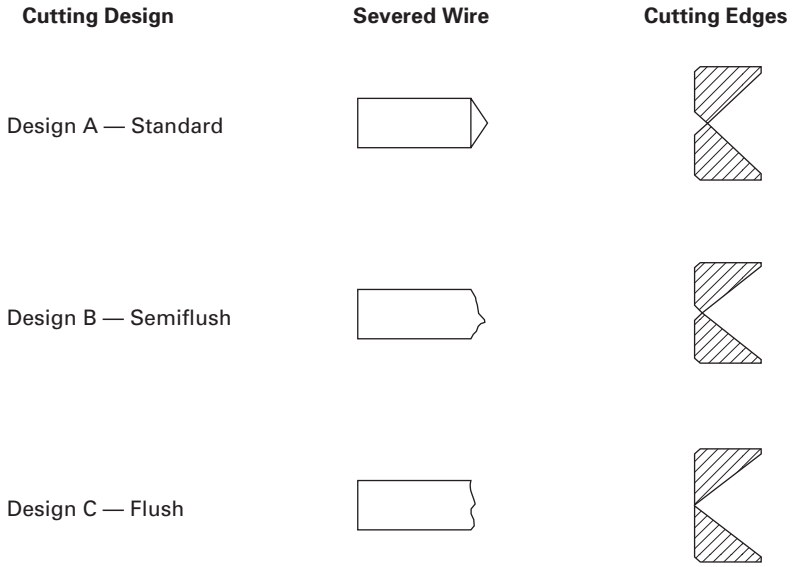
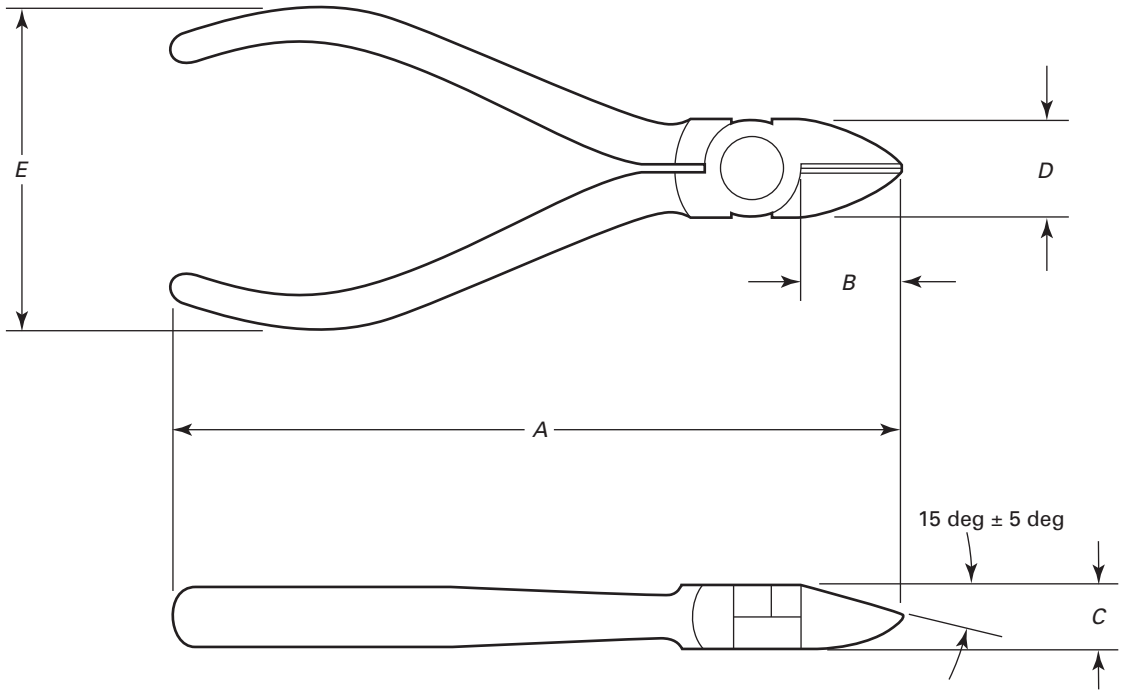


Fig. 2 Type I, Class 1, Style A, Oval Head



标准分享网 www.bzfxw.com 免费下载

Fig. 3 Type I, Class 1, Style B, Relieved Oval Head

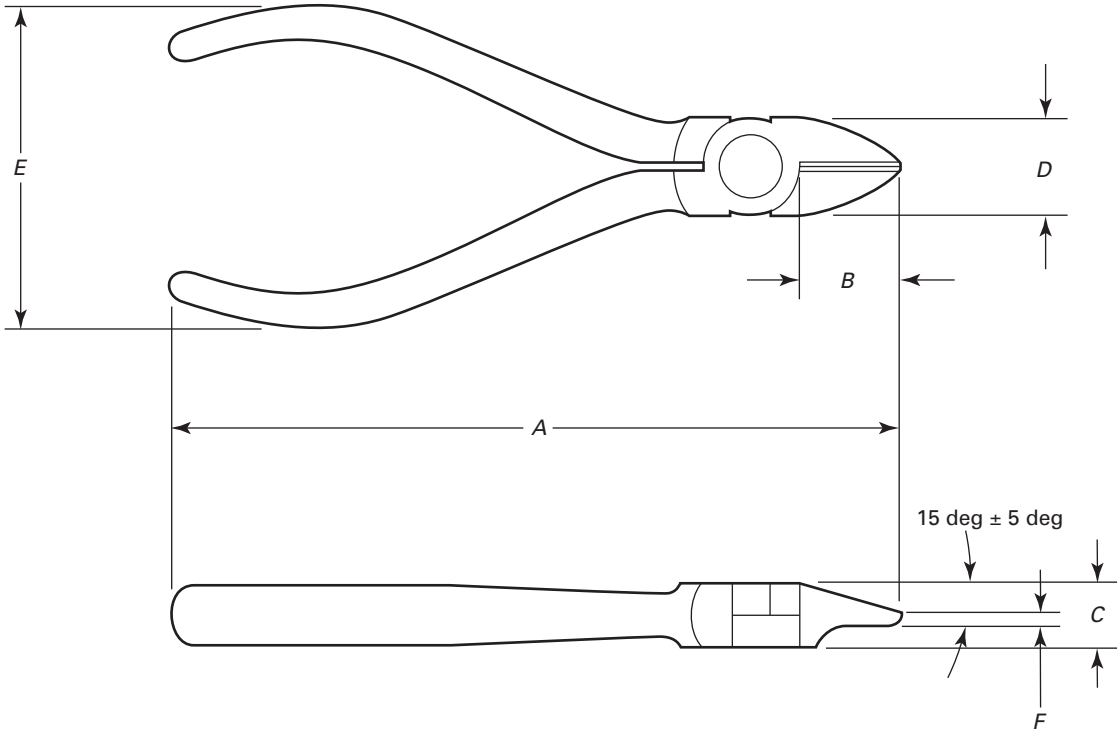


Fig. 4 Type I, Class 1, Style C, Tapered Head

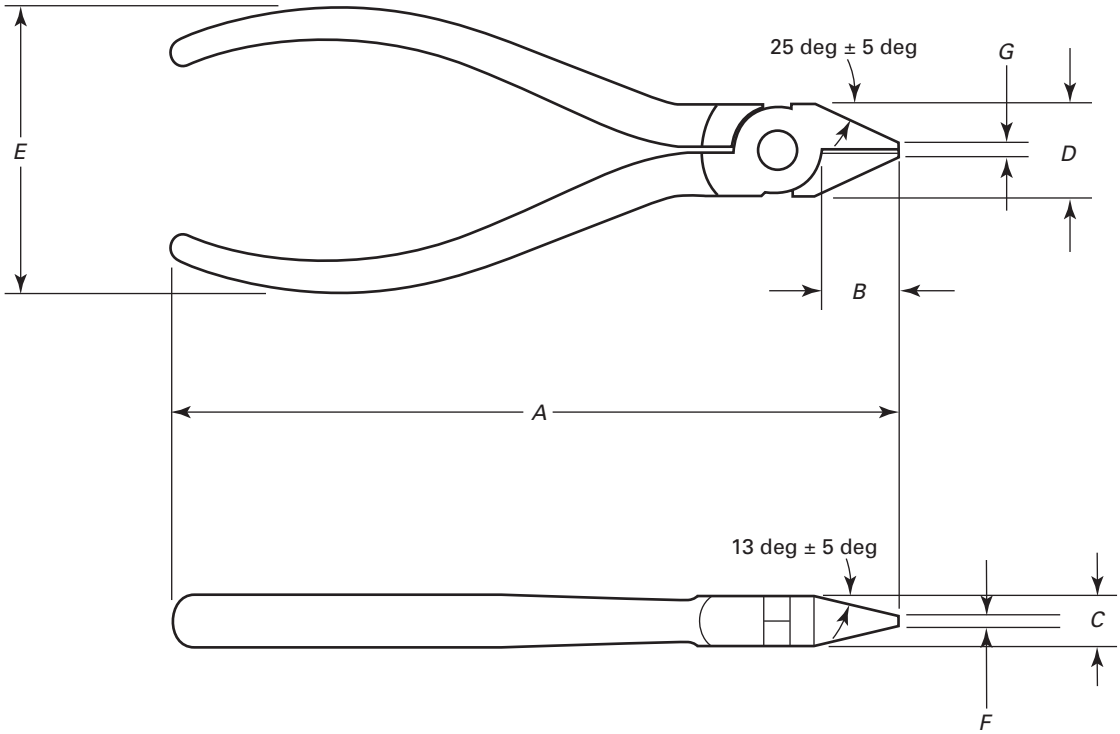
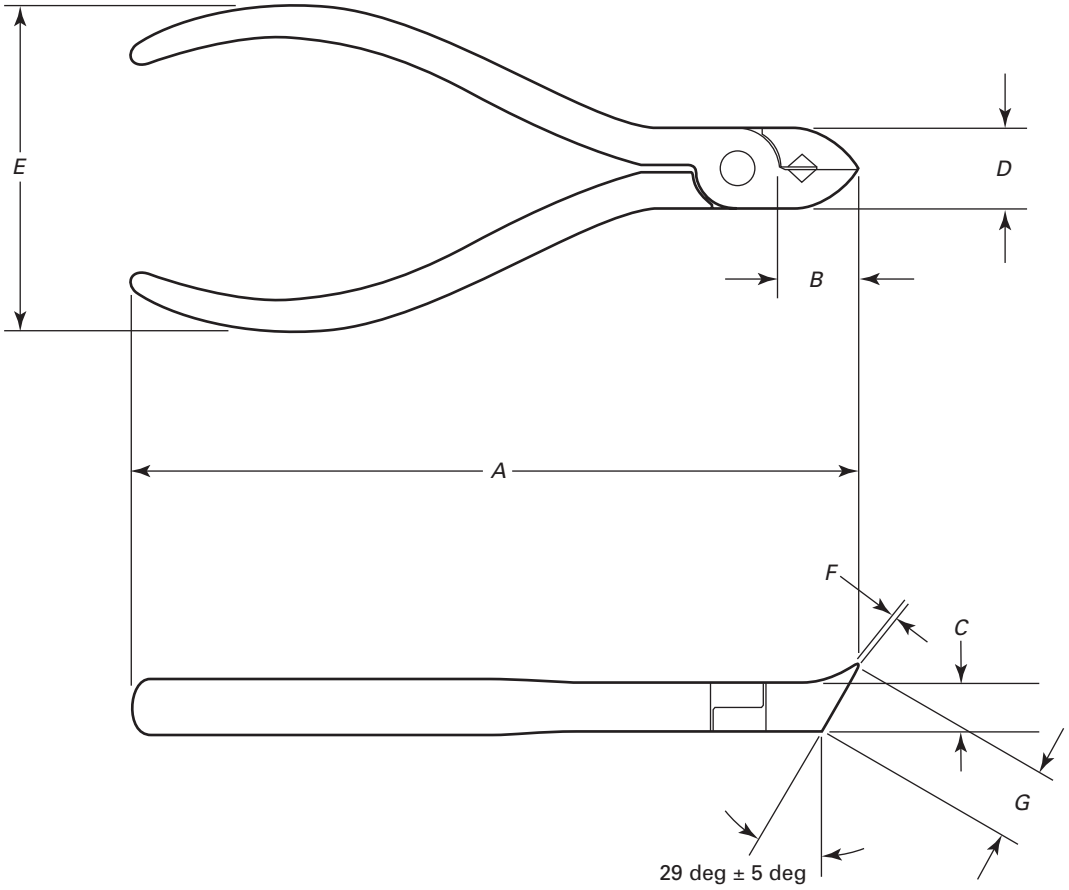


Fig. 5 Type I, Class 2, Offset Nippers (Oblique)



标准分享网 www.bzfxw.com 免费下载

Fig. 6 Type I, Class 3, Transverse Cutters (End)

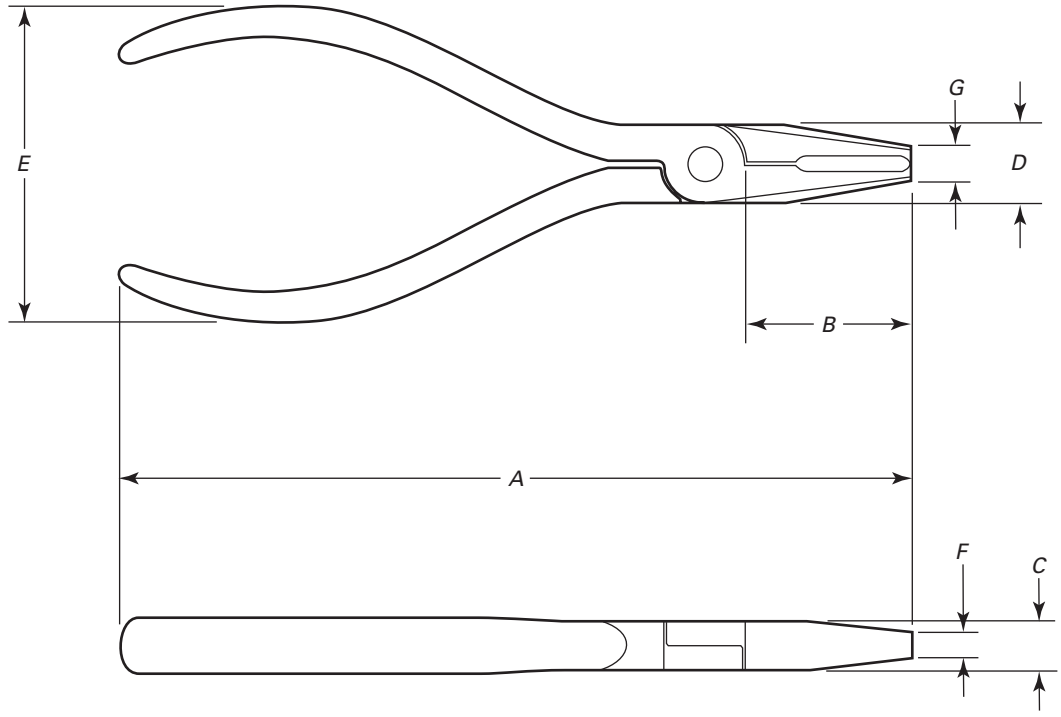


Fig. 7 Type I, Class 4, End Cutters (Angle)

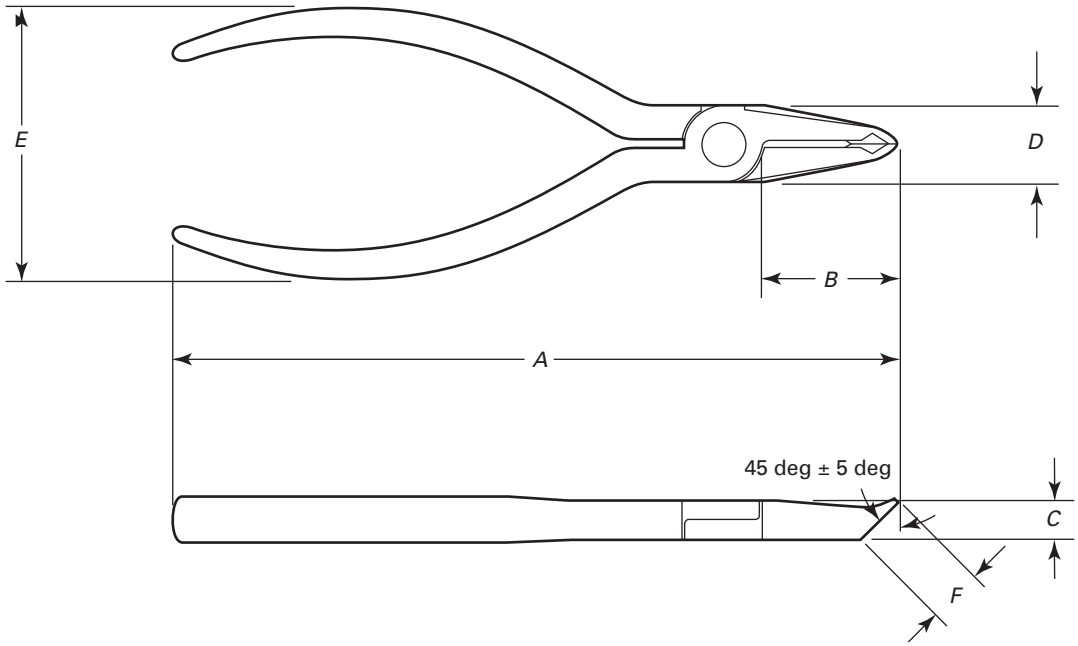


Fig. 8 Type II, Class 1, Flat Nose

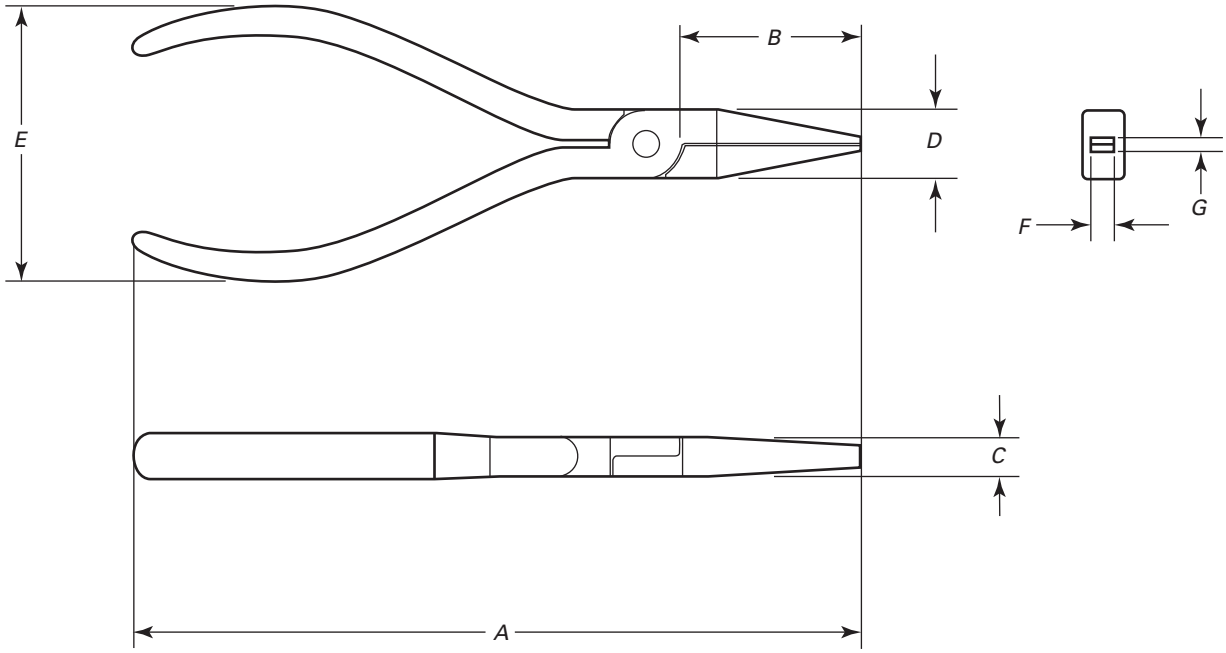
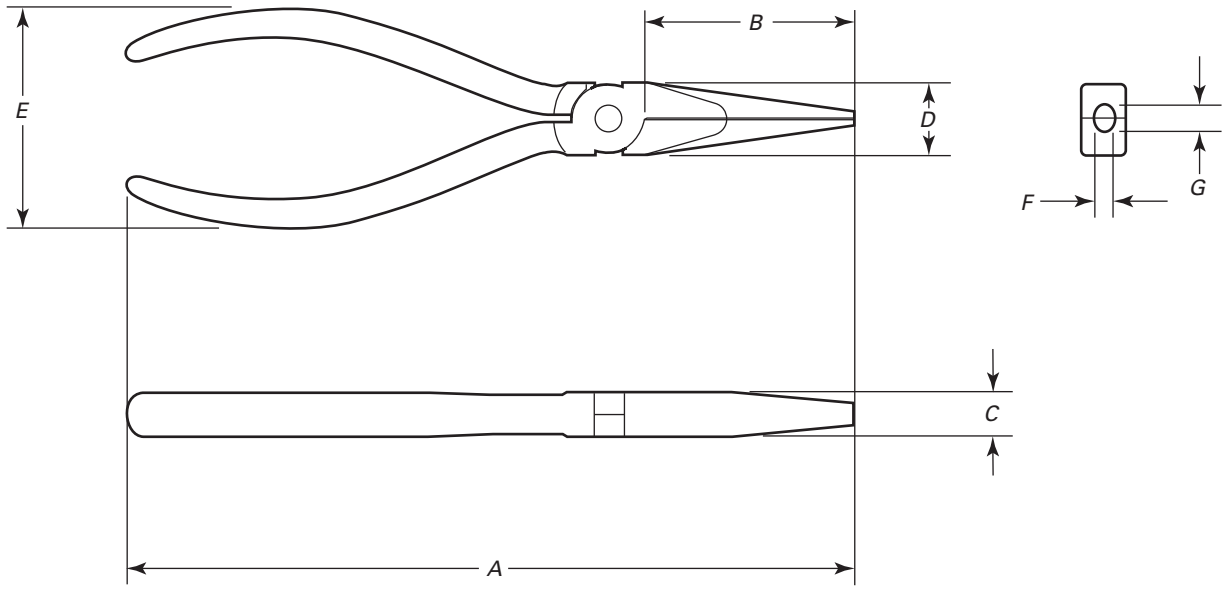


Fig. 9 Type II, Class 2, Style A, Long Nose Without Side Cutter



标准分享网 www.bzfxw.com 免费下载

Fig. 10 Type II, Class 2, Style B, Long Nose With Side Cutter

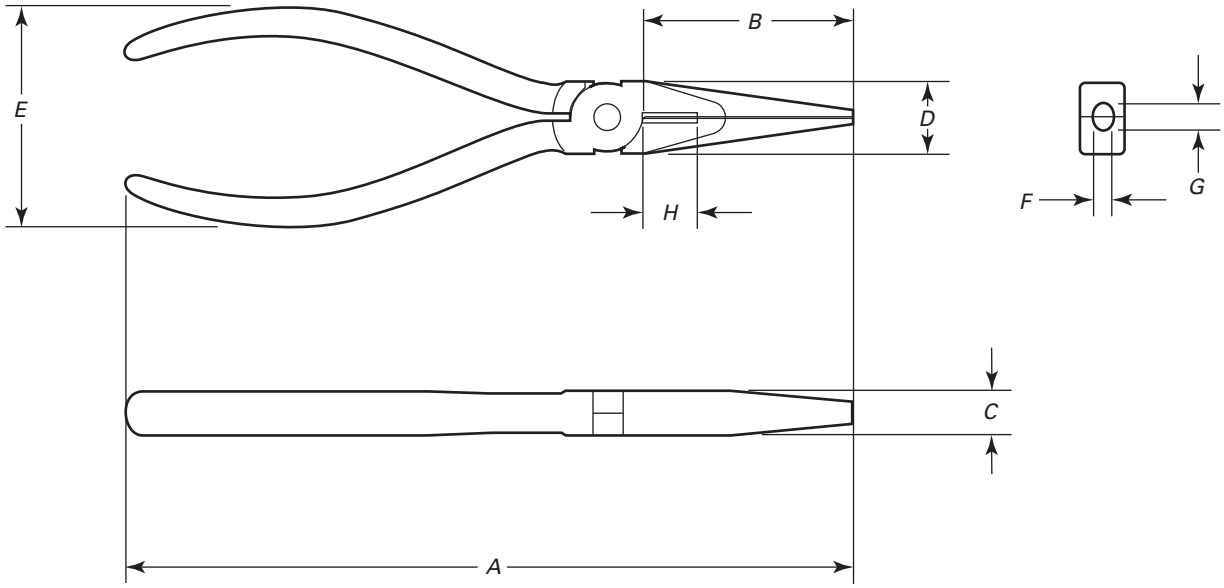


Fig. 11 Type II, Class 2, Style C, Curved Nose

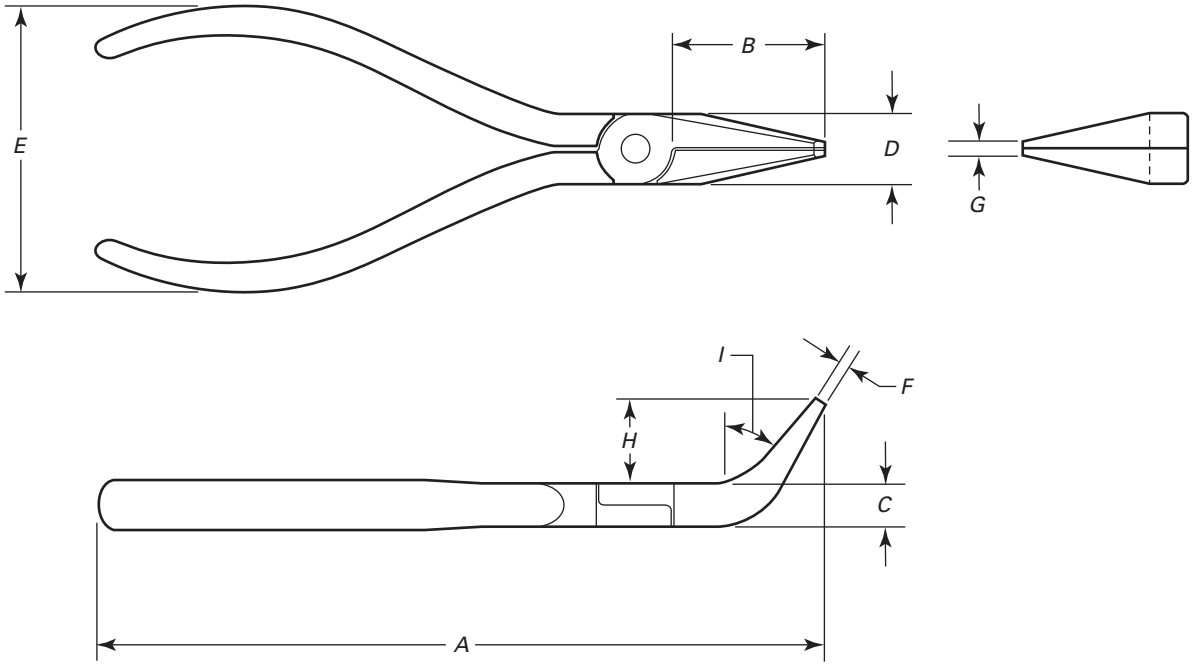


Fig. 12 Type II, Class 2, Style D, Short Nose

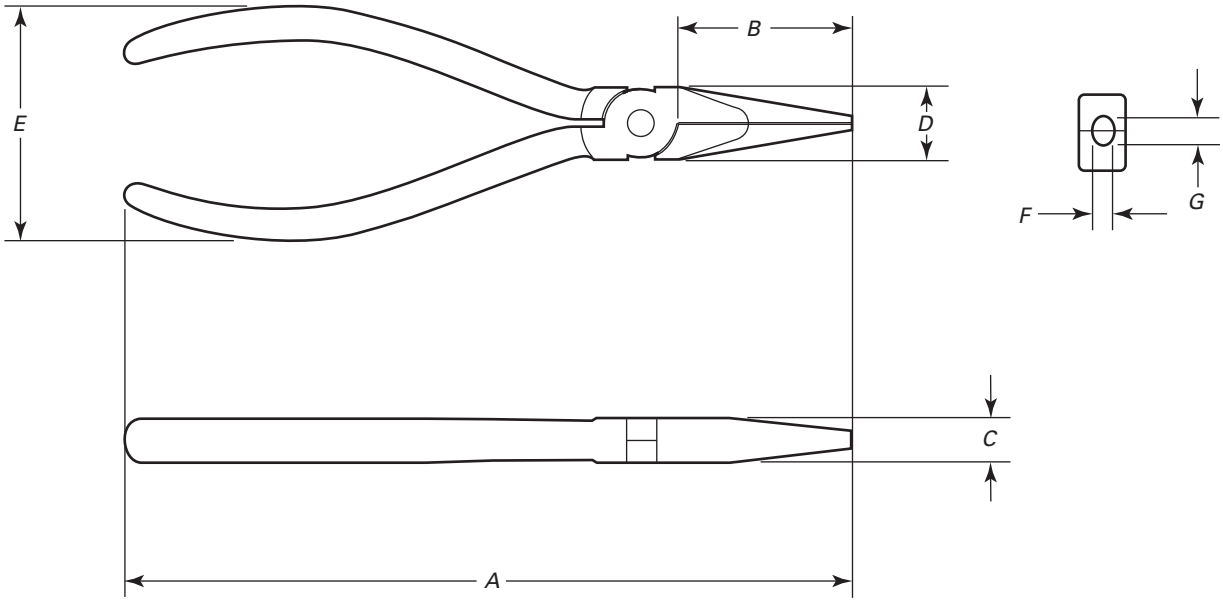
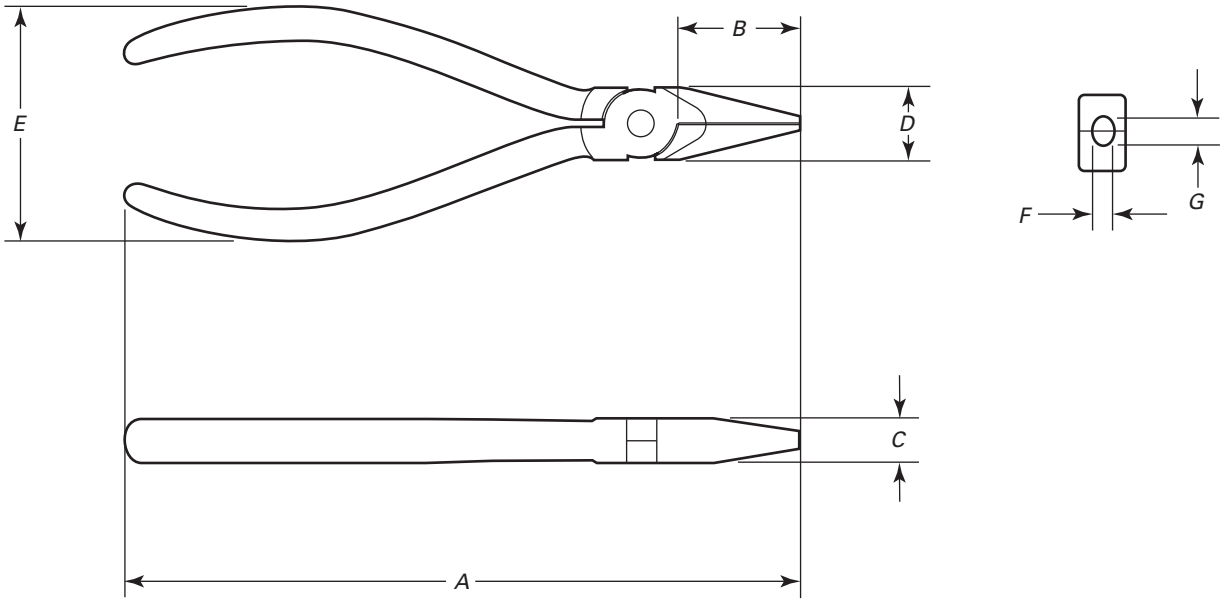


Fig. 13 Type II, Class 2, Style E, Subminiature



标准分享网 www.bzfxw.com 免费下载

Fig. 14 Type II, Class 3, Long Nose With Tip Cutter

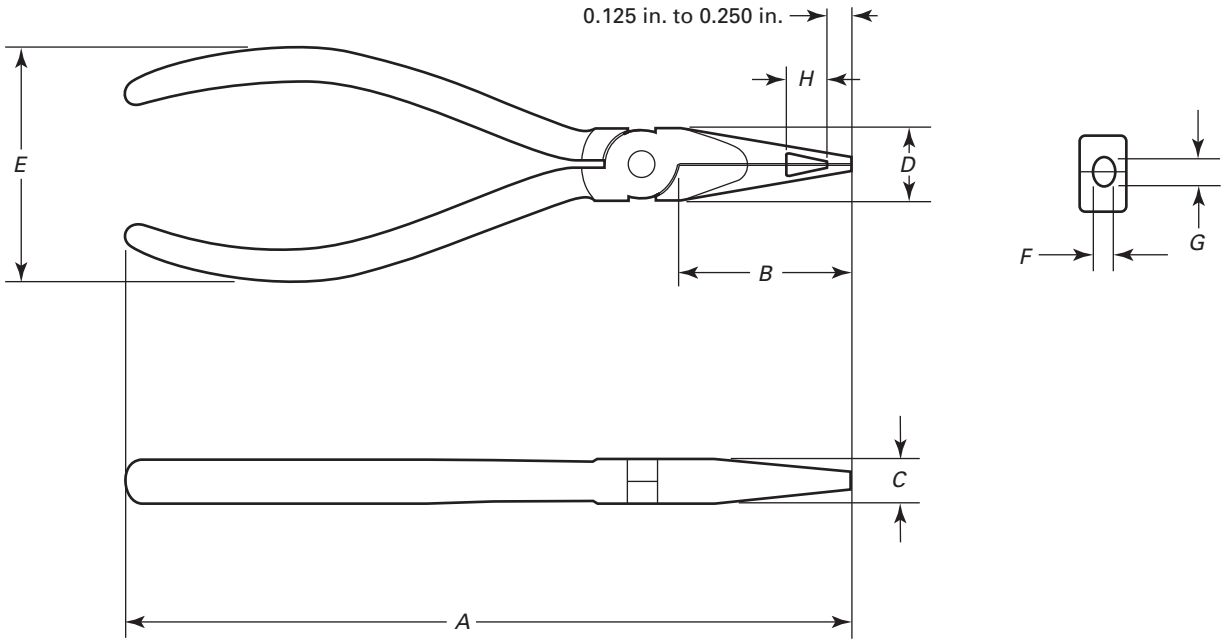


Fig. 15 Type II, Class 4, Needle Nose

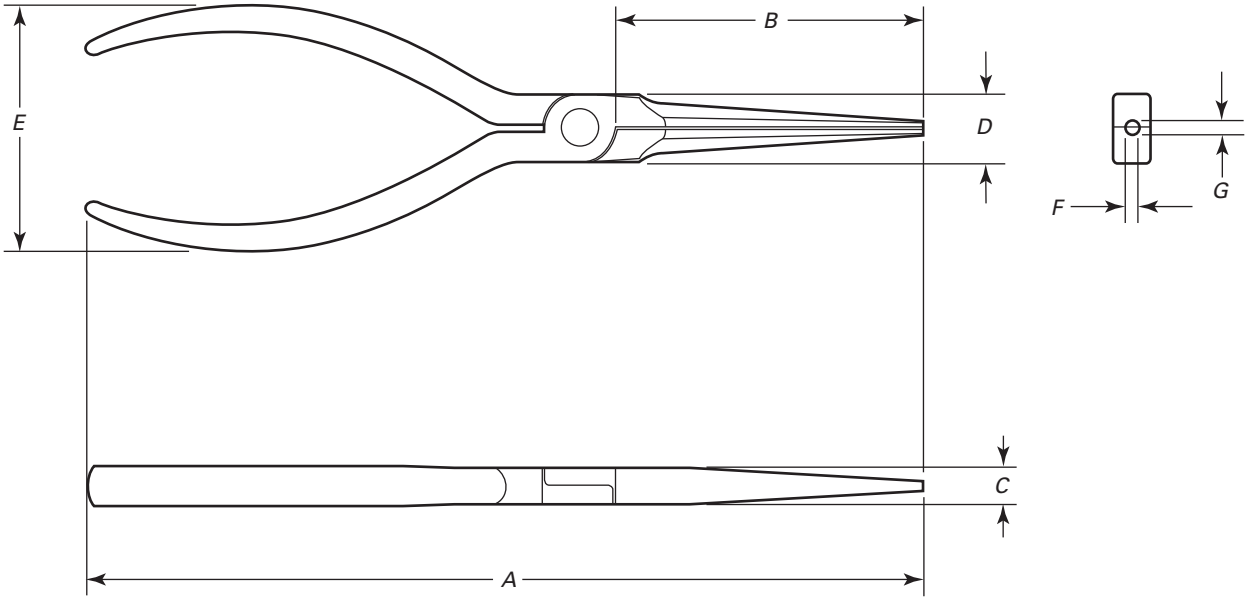


Fig. 16 Type II, Class 5, Round Nose

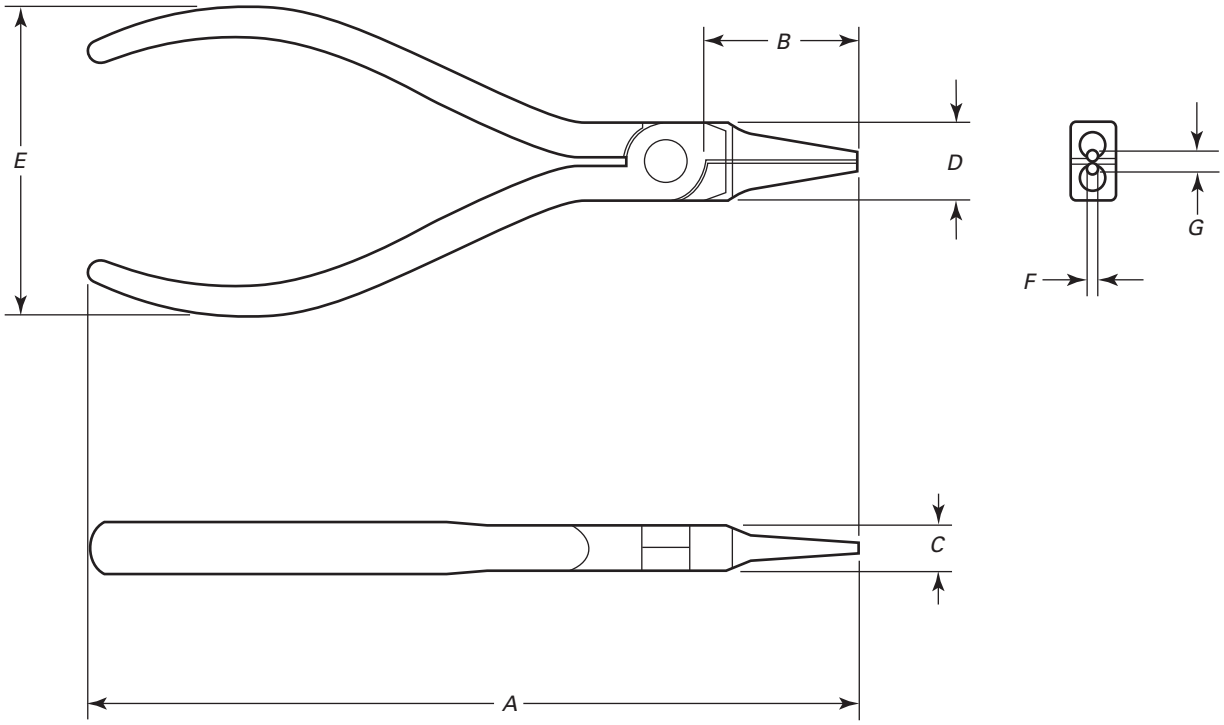


Table 1 Wire Cut Test Specifications

Type	Cutting Design	Wire Tensile Strength, psi, ±10%	Maximum Moment, lbf-in.	Wire Type
All except	Design A — Standard	120,000	100	Steel
Type II Class 3	Design B — Semiflush	90,000	50	Steel
	Design C — Flush	70,000	50	Steel
Type II Class 3		33,381	100 in.-lb	Copper

GENERAL NOTE: Steel wire shall be 0.034 ± 0.002-in. diameter, uncoated steel, single strand. Copper wire shall be 0.034 ± 0.002-in. diameter, single strand.

标准分享网 www.bzfxw.com 免费下载

Table 2 Dimensions for Type I, Class 1, Style A, Oval Head

Nominal Size, in.	Overall Length, *A* [Note (1)], in. +0.187 −0.250	Jaw Length, *B*, in., ±0.094	Joint Thickness, *C*, in., ±0.040	Jaw Width, *D*, in., +0.032 −0.046	Handle Span, *E* [Note (1)], in., +0.125 −0.187	Minimum Jaw Opening, in.
4	4.125	0.437	0.250	0.437	1.875	0.156
$4\frac{1}{2}$	4.625	0.500	0.281	0.468	1.875	0.156

NOTE:

(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 3 Dimensions for Type I, Class 2, Style B, Relieved Oval Head

Nominal Size, in.	Overall Length, *A* [Note (1)], in., +0.187 −0.250	Jaw Length, *B*, in., ±0.094	Joint Thickness, *C*, in., ±0.040	Jaw Width, *D*, in., +0.032 −0.046	Handle Span, *E* [Note (1)], in., +0.125 −0.187	Tip Width, *F*, in., ±0.015	Minimum Jaw Opening, in.
4	4.125	0.437	0.250	0.437	1.875	0.032	0.156
$4\frac{1}{2}$	4.625	0.500	0.281	0.468	1.875	0.032	0.156

NOTE:

(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 4 Dimensions for Type I, Class 1, Style C, Tapered Head

Nominal Size, in.	Overall Length, *A* [Note (1)], in. +0.187 −0.250	Jaw Length, *B*, in., ±0.094	Joint Thickness, *C*, in., ±0.040	Jaw Width, *D*, in., +0.032 −0.046	Handle Span, *E* [Note (1)], in., +0.125 −0.187	Tip Width, *F*, in., ±0.015	Tip Thickness, *G*, in., ±0.062	Minimum Jaw Opening, in.
4	4.125	0.437	0.250	0.437	1.875	0.032	0.062	0.156
$4\frac{1}{2}$	4.625	0.500	0.281	0.468	1.875	0.032	0.062	0.156

NOTE:

(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 5 Dimensions for Type I, Class 2, Offset Nippers (Oblique)

Nominal Size, in.	Overall Length, *A* [Note (1)], in. +0.187	Jaw Length, *B*, in., ±0.062	Joint Thickness, *C*, in., ±0.032	Jaw Width, *D*, in., +0.032	Handle Span, *E* [Note (1)], in., +0.125	Tip Width, *F*, in. ±0.015	Cutter Length, *G*, in., ±0.094	Minimum Jaw Opening, in.
4	4.125	0.437	0.250	0.437	1.875	0.032	0.437	0.156

NOTE:
(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 6 Dimensions for Type I, Class 3, Transverse Cutters (End)

Nominal Size, in.	Overall Length, *A* [Note (1)], in., +0.187	Jaw Length, *B*, in., +0.125 −0.250	Joint Thickness, *C*, in., ±0.032	Jaw Width, *D*, in., +0.032	Handle Span, *E* [Note (1)], in., +0.125	Tip Width, *F*, in., ±0.032	Tip Thickness, *G*, in., ±0.032	Minimum Jaw Opening, in.
4½	4.687	1.000	0.250	0.437	1.875	0.032	0.437	0.375

NOTE:
(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 7 Dimensions for Type I, Class 4, End Cutters (Angle)

Nominal Size, in.	Overall Length, *A* [Note (1)], in., ±0.187	Jaw Length, *B*, in., +0.125	Joint Thickness, *C*, in., ±0.032	Jaw Width, *D*, in., ±0.032	Handle Span, *E* [Note (1)], in., ±0.125	Cutter Length, *F*, in., ±0.032	Minimum Jaw Opening, in.
5	5.062	0.937	0.281	0.500	1.875	0.250	0.375

NOTE:
(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 8 Dimensions for Type II, Class 1, Flat Nose

Nominal Size, in.	Overall Length, *A* [Note (1)], in., ±0.187	Jaw Length, *B*, in., ±0.125	Joint Thickness, *C*, in., ±0.032	Jaw Width, *D*, in., ±0.032	Handle Span, *E* [Note (1)], in., ±0.125	Tip Width, *F*, in., ±0.015	Tip Thickness, *G*, in., ±0.020	Minimum Jaw Opening, in.
4½	4.875	1.187	0.250	0.437	1.875	0.140	0.078	0.500
5½	5.625	1.500	0.281	0.500	1.875	0.140	0.078	0.500

NOTE:
(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

标准分享网 www.bzfxw.com 免费下载

Table 9 Dimensions for Type II, Class 2, Style A, Long Nose Without Side Cutter

Nominal Size, in.	Overall Length, *A* [Note (1)], in., ±0.187	Jaw Length, *B*, in., ±0.094	Joint Thickness, *C*, in., +0.032, −0.062	Jaw Width, *D*, in., +0.032	Handle Span, *E* [Note (1)], in., ±0.250	Tip Width, *F*, in., ±0.015	Tip Thickness, *G*, in., ±0.020	Minimum Jaw Opening, in.
4½	4.875	1.187	0.250	0.437	1.875	0.062	0.078	0.500
5½	5.625	1.687	0.281	0.500	1.875	0.062	0.078	0.500

NOTE:

(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 10 Dimensions for Type II, Class 2, Style B, Long Nose With Side Cutter

Nominal Size, in.	Overall Length, *A* [Note (1)], in., ±0.187	Jaw Length, *B*, in., ±0.062	Joint Thickness, *C*, in., ±0.032	Jaw Width, *D*, in., ±0.032	Handle Span, *E* [Note (1)], in., ±0.250	Tip Width, *F*, in., ±0.015	Tip Thickness, *G*, in., ±0.015	Cutter Length, *H*, in., ±0.050	Minimum Jaw Opening, in.
4½	4.875	1.187	0.250	0.437	1.875	0.062	0.078	0.234	0.375
5½	5.625	1.687	0.281	0.500	1.875	0.062	0.078	0.360	0.500

NOTE:

(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 11 Dimensions for Type II, Class 2, Style C, Curved Nose

Nominal Size, in.	Overall Length, *A* [Note (1)], in., ±0.187	Jaw Length, *B*, in., ±0.062	Joint Thickness, *C*, in., ±0.032	Jaw Width, *D*, in., ±0.032	Handle Span, *E* [Note (1)], in., ±0.125	Tip Width, *F*, in., ±0.015	Tip Thickness, *G*, in., ±0.015	Bend Height, *H*, in., ±0.062	Jaw Angle, *I*, deg, ±20	Minimum Jaw Opening, in.
4½	4.625	0.937	0.250	0.437	1.875	0.062	0.078	0.500	40	0.375
5½	5.687	1.562	0.281	0.500	1.875	0.062	0.078	0.312	45	0.500

NOTE:

(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 12 Dimensions for Type II, Class 2, Style D, Short Nose

Nominal Size, in.	Overall Length, *A* [Note (1)], in., ±0.187	Jaw Length, *B*, in., ±0.125	Joint Thickness, *C*, in., +0.032	Jaw Width, *D*, in., +0.032	Handle Span, *E* [Note (1)], in., ±0.187	Tip Width, *F*, in., ±0.020	Tip Thickness, *G*, in., +0.032 −0.015	Minimum Jaw Opening, in.
4½	4.625	0.937	0.250	0.437	1.875	0.047	0.047	0.375
5	5.187	1.250	0.281	0.500	1.875	0.062	0.062	0.500

NOTE:

(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 13 Dimensions for Type II, Class 2, Style E, Subminiature

Nominal Size, in.	Overall Length, *A* [Note (1)], in., ±0.187	Jaw Length, *B*, in., ±0.062	Joint Thickness, *C*, in., ±0.032	Jaw Width, *D*, in., ±0.032	Handle Span, *E* [Note (1)], in., ±0.125	Tip Width, *F*, in., ±0.015	Tip Thickness, *G*, in., ±0.015	Minimum Jaw Opening, in.
4	4.00	0.812	0.250	0.375	1.750	0.032	0.047	0.375

NOTE:
(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 14 Dimensions for Type II, Class 3, Long Nose With Tip Cutter

Nominal Size, in.	Overall Length, *A* [Note (1)], in., ±0.250	Jaw Length, *B*, in., ±0.062	Joint Thickness, *C*, in., ±0.094	Jaw Width, *D*, in., ±0.032	Handle Span, *E* [Note (1)], in., ±0.187	Tip Width, *F*, in., ±0.015	Tip Thickness, *G*, in., ±0.015	Cutter Length, *H*, in., ±0.032	Minimum Jaw Opening, in.
4½	4.875	1.187	0.250	0.437	1.875	0.062	0.078	0.187	0.500
5	5.250	1.250	0.281	0.500	1.875	0.062	0.094	0.250	0.500

NOTE:
(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 15 Dimensions for Type II, Class 4, Needle Nose

Nominal Size, in.	Overall Length, *A* [Note (1)], in., ±0.187	Jaw Length, *B*, in., ±0.062	Joint Thickness, *C*, in., ±0.032	Jaw Width, *D*, in., +0.032 −0.047	Handle Span, *E* [Note (1)], in., +0.250	Tip Width, *F*, in., ±0.015	Tip Thickness, *G*, in., ±0.020	Minimum Jaw Opening, in.
4½	4.625	1.187	0.250	0.437	1.875	0.062	0.078	0.500
5½	5.625	1.687	0.281	0.500	1.875	0.062	0.078	0.500

NOTE:
(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

Table 16 Dimensions for Type II, Class 5, Round Nose

Nominal Size, in.	Overall Length, *A* [Note (1)], in., ±0.187	Jaw Length, *B*, in., ±0.062	Joint Thickness, *C*, in., ±0.032	Jaw Width, *D*, in., ±0.032	Handle Span, *E* [Note (1)], in., ±0.187	Tip Width, *F*, in., +0.015 −0.032	Tip Thickness, *G*, in., +0.032 −0.062	Minimum Jaw Opening, in.
4½	4.562	0.875	0.25	0.437	1.875	0.062	0.125	0.375

NOTE:
(1) *A* and *E* dimensions in this table are without comfort grips. Comfort grips shall not increase dimension *A* by more than 0.25 in. and dimension *E* by more than 0.50 in.

标准分享网 www.bzfxw.com 免费下载

ASME B107.23

PLIERS: MULTIPLE POSITION, ADJUSTABLE

1 SCOPE

This Standard provides performance and safety requirements for adjustable joint and slip joint pliers. Inclusion of dimensional data in this Standard does not mean that all pliers described herein are stock production sizes. Consumers should 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 covered tools.

2 DEFINITIONS

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

3 REFERENCE

The following publication is referenced in this Standard.

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

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

4 CLASSIFICATIONS

Type I: adjustable joint, angle nose
- *Class 1:* multiple grooves and tongue
  - Style A: straight, serrated jaws
  - Style B: curved, serrated jaws
  - Style C: parrot-nose jaws
  - Style D: straight, smooth jaws
- *Class 2:* multiple hole

Type II: slip joint, combination jaw
- *Class 1:* straight nose
  - Style A: regular
  - Style B: thin

5 PERFORMANCE REQUIREMENTS

Illustrations shown herein are descriptive, not restrictive, and are not intended to preclude the manufacture of pliers that otherwise comply with this Standard. All figures are shown without comfort grips. Dimensions in tables are without comfort grips. Table values are in inches unless otherwise specified.

5.1 Design

Pliers shall be similar to the figure to which reference is made and shall be proportioned in all parts so as to be strong, durable, and easy to operate. Pliers shall withstand applicable test procedures without cracking or breaking.

5.1.1 Type I: Adjustable Joint, Angle Nose. Type I pliers shall have jaws offset 37 deg to 56 deg as measured between the centerline of the jaws and the centerline of the handles. The gripping surfaces shall have sharp, crosswise grooves the full length of the jaws, except for Style D pliers, which shall have smooth gripping surfaces. With the jaws parallel in any of the operating positions, the maximum distance between the outsides of the handles at their point of widest separation shall not exceed the values in Table 1 or Table 2. With the jaws parallel in the outermost operating position, the work capacity of the jaws shall not be less than the minimum work capacity specified in Table 1 or Table 2. Handles shall not contact each other when the jaws are parallel in any of the operating positions.

5.1.1.1 Class 1: Multiple Grooves, Tongue. Pliers shall have a number of curved grooves on one pliers' half and a curved tongue on the other pliers' half. The two pliers' halves shall be held together by a joining member (e.g., fastener, rivet, or other). Changes in jaw capacity shall be made by sliding the joining member in a centrally located slot in the grooved pliers' half.

(a) Style A: Straight, Serrated Jaws. Pliers shall conform to the requirements shown in Table 1 and be similar to Fig. 1.

(b) Style B: Curved, Serrated Jaws. Pliers shall conform to the requirements shown in Table 1 and be similar to Fig. 2.

(c) Style C: Parrot-Nose Jaws. Pliers shall conform to the requirements shown in Table 2 and be similar to Fig. 3.

(d) Style D: Straight, Smooth Jaws. Pliers shall conform to the requirements shown in Table 1 and be similar to Fig. 4.

5.1.1.2 Class 2: Multiple Holes. Pliers shall have a number of holes on one pliers' half and a stationary joining member (e.g., fastener, rivet, or other) on the

标准分享网 www.bzfxw.com 免费下载

other pliers' half. The joining member shall permit adjustment of the two halves of the pliers and shall not disengage under load. Changes in jaw capacity shall be made by sliding the multiple hole side of the pliers on the joining member. Pliers shall conform to the requirements shown in Table 3 and shall be similar to Fig. 5.

5.1.2 Type II: Slip Joint, Combination Jaw. Pliers shall have two holes on one pliers' half and a stationary joining member (e.g., fastener, rivet, or other) on the other pliers' half. They may have a wire cutter. Changes in jaw position shall be made by slipping the double-hole side of the pliers on the joining member. Combination jaws shall have straight serrated gripping surfaces at the outer end of the jaws and curved serrated gripping surfaces behind the outer gripping surfaces.

5.1.2.1 Class 1: Straight Nose. Pliers shall have a straight nose.

(a) Style A: Regular. Pliers shall conform to the requirements shown in Table 4 and shall be similar to Fig. 6.

(b) Style B: Thin. Pliers shall conform to the requirements shown in Table 5 and shall be similar to Fig. 7.

5.1.2.2 Class 2: Bent Nose. Pliers shall have a nose bent to an angle of 20 deg to 30 deg. The pliers shall conform to the requirements shown in Table 6 and be similar to Fig. 8.

5.2 Materials

The materials used in the manufacture of the pliers shall be such as to produce pliers conforming to this Standard.

5.3 Finish

Metallic surfaces shall have a rust preventive treatment and be free from pits, nodules, burrs, cracks, and other conditions that would adversely affect the performance or safety of the pliers. When provided, coatings shall be adherent and free from any condition 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 may be readily determined. The marking shall be as permanent as the pliers to which it is applied (provided the surface to which it was applied 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

5.5.1 Characteristics. Handles shall be shaped to afford a comfortable grip. Handle surfaces shall be free from rough edges and sharp corners. Handles shall have a hardness from 35 HRC to 60 HRC or equivalent. Handle surfaces shall be smooth, knurled, impressed, or furnished with comfort grips.

5.5.2 Set. A permanent set of handles shall not exceed the maximum distance specified in Table 7 when pliers are subjected to the handle load test specified in para. 6.2.

5.5.3 Comfort Grips. When comfort grips are furnished on handles, they shall be made of a polymer of rubber, plastic, or other suitable material capable of withstanding long, hard usage without deterioration or rubbing off and meet the solvent resistance test specified in para. 6.4. Comfort grips shall remain permanently attached under normal use. Unless specifically designed, labeled, and tested for such use, tools with comfort grips shall not be advertised or marked as having any nonconductive or electrically insulating properties.

5.6 Joint

Pliers' halves shall be joined in a permanent manner using a fastener, rivet, or other suitable means. The joint shall operate without binding in all positions and shall not disengage under load. The joint shall not require adjustment. The joint shall pass the test specified in para. 6.2. Fastener hardness shall be from 25 HRC to 50 HRC except when case hardened; a maximum hardness equivalent to 60 HRC shall be permitted.

5.7 Jaws

5.7.1 Jaw Openings. Jaws shall open to the respective work capacity specified herein for individual type, class, style, and size pliers.

5.7.2 Jaw Hardness. Jaw hardness within 0.06 in. of the root of the groove form and wire cutter, as applicable, shall be 45 HRC to 60 HRC.

6 TESTS

Many tests required herein are inherently dangerous. Adequate safeguards for personnel and property shall be used when conducting such tests.

6.1 Pliers' Hardness Test

Pliers' hardness tests shall be conducted per ASME B107.25, para. 4.3.

6.2 Handle Load Test

Handle load test shall be conducted per ASME B107.25, para. 4.1 and Table 7 herein. The pliers shall be tested with the comfort grips removed. The loads shall be applied at the point of maximum handle curvature. The jaws of the pliers at their outermost end shall grip approximately 0.13 in. of a flat steel insert of sufficient thickness to prevent the handles from contacting each other during the test. The permanent set of

the handles shall not exceed the applicable values shown in Table 7.

6.3 Wire Cut Test

Type II pliers with cutting edges shall complete three cuts of uncoated, single strand steel wire having a minimum tensile strength of 150,000 psi (1 033 MPa). There shall be no visible deformation or damage to the cutter. Wire sizes appear in Table 8.

6.4 Solvent Resistance Test

Solvent resistance tests shall be conducted in accordance with ASME B107.25, para. 4.5.

7 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

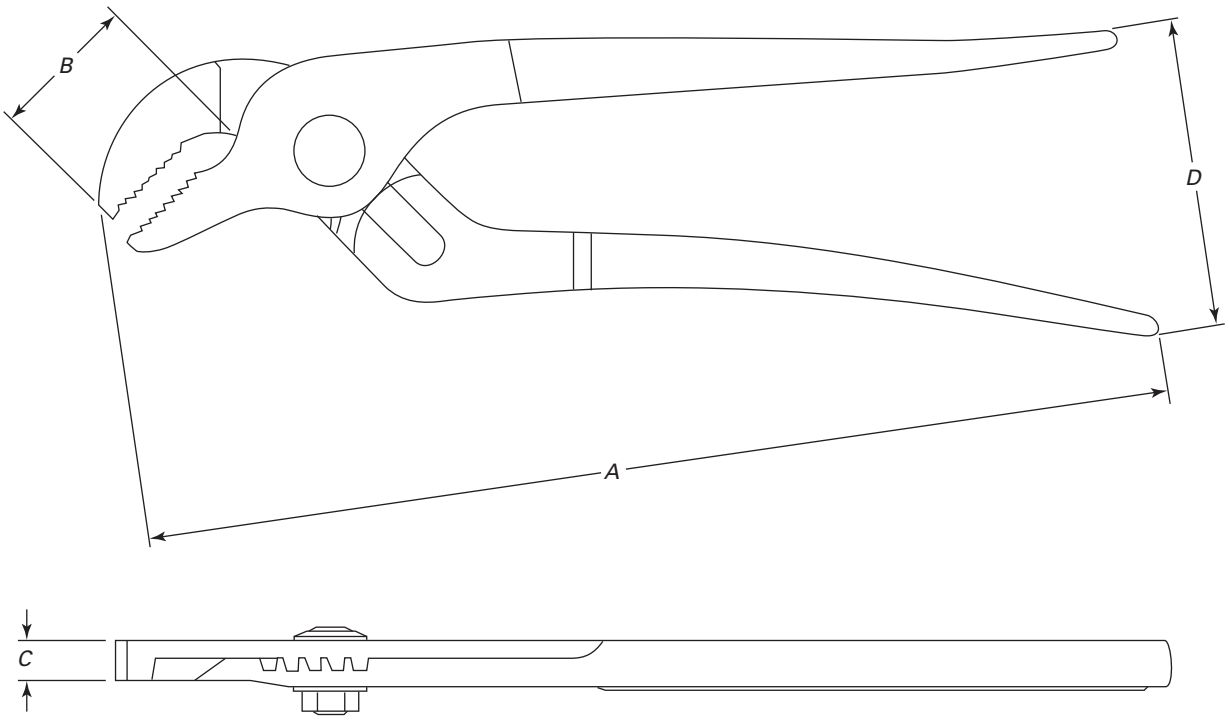
Instructors and employers shall stress proper use and safety in the use of pliers, information about which can be found in the HTI publication, *Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care*.

8 DESIGNATIONS

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

(a) type
(b) class
(c) nominal size
(d) style

Fig. 1 Type I, Class 1, Style A: Adjustable Joint, Angle Nose, Multiple Grooves, Tongue, Straight, Serrated Jaws



标准分享网 www.bzfxw.com 免费下载

Fig. 2 Type I, Class 1, Style B: Adjustable Joint, Angle Nose, Multiple Grooves, Tongue, Curved, Serrated Jaws

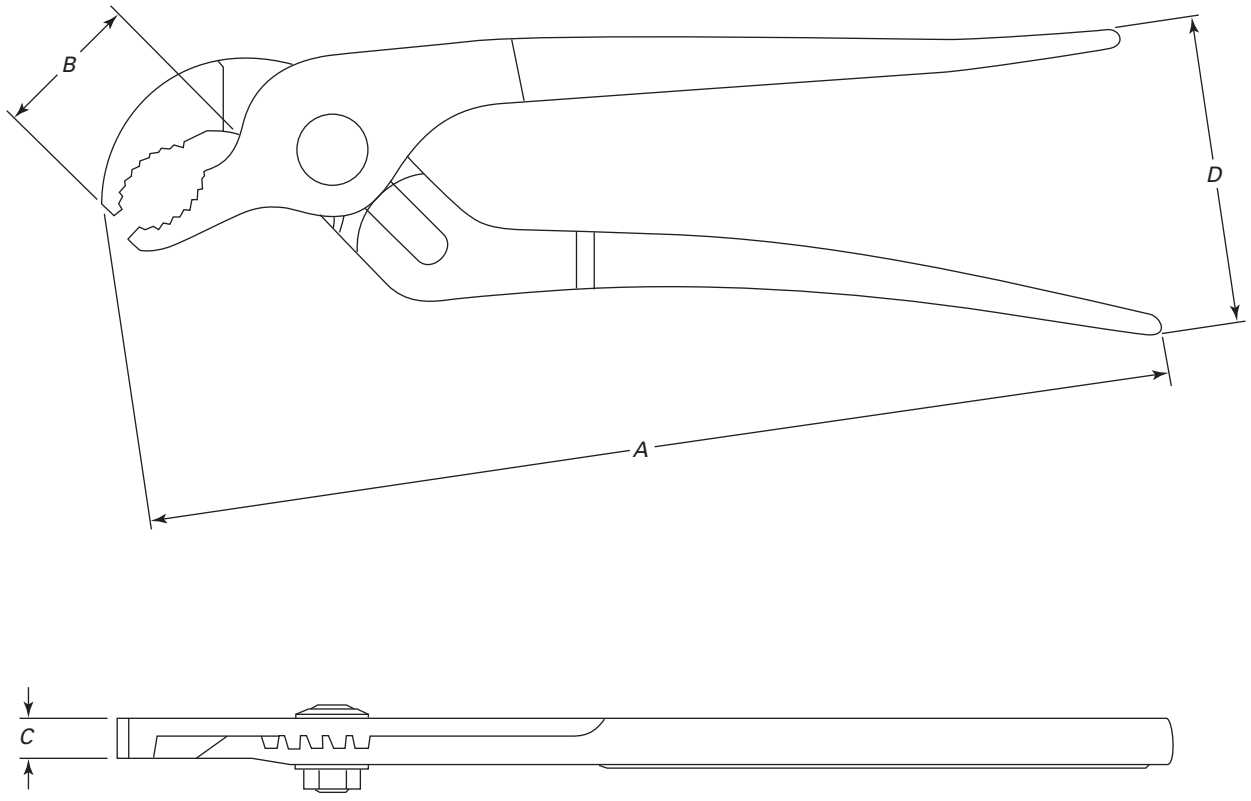
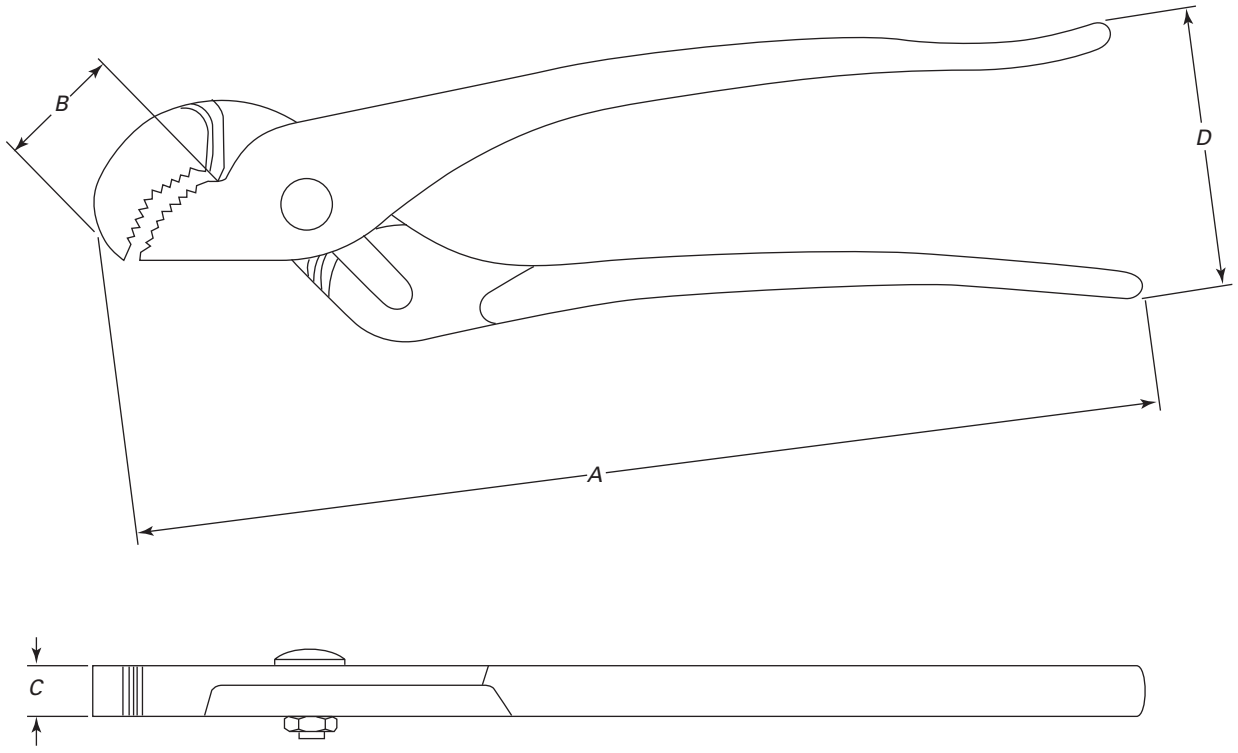


Fig. 3 Type I, Class 1, Style C: Adjustable Joint, Angle Nose, Multiple Grooves, Tongue, Parrot-Nosed Jaws



标准分享网 www.bzfxw.com 免费下载

Fig. 4 Type I, Class 1, Style D: Adjustable Joint, Angle Nose, Multiple Grooves, Tongue, Straight, Smooth Jaws

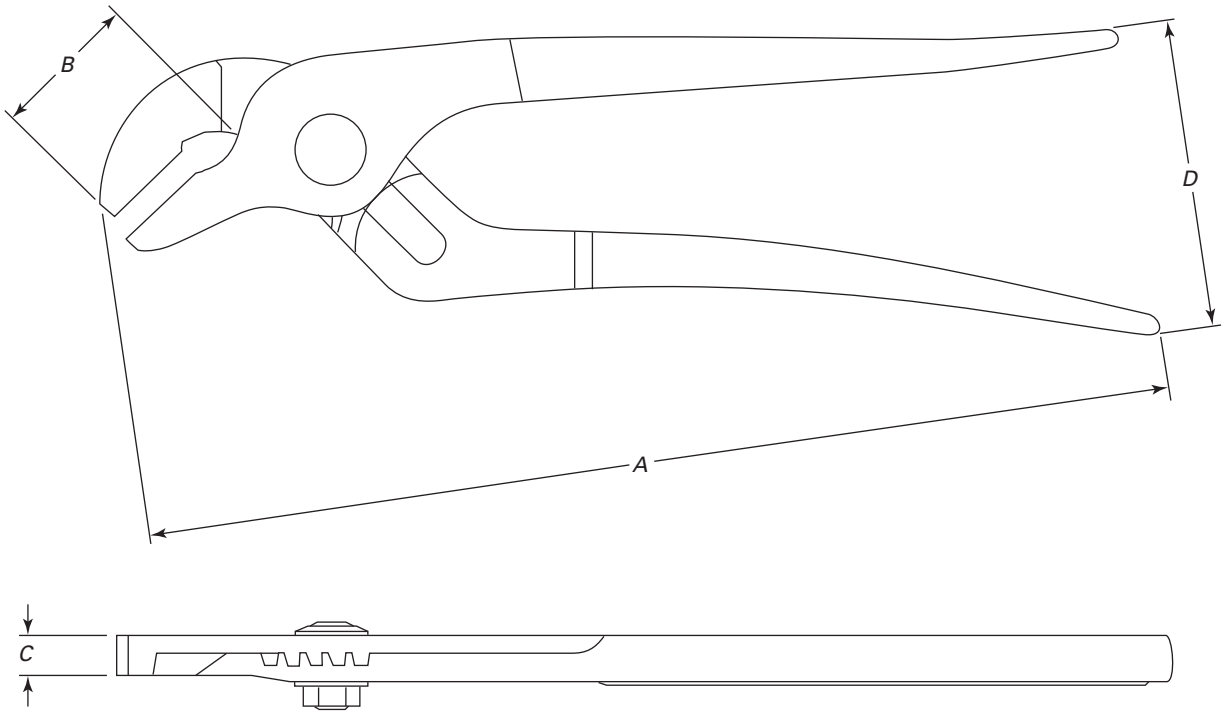
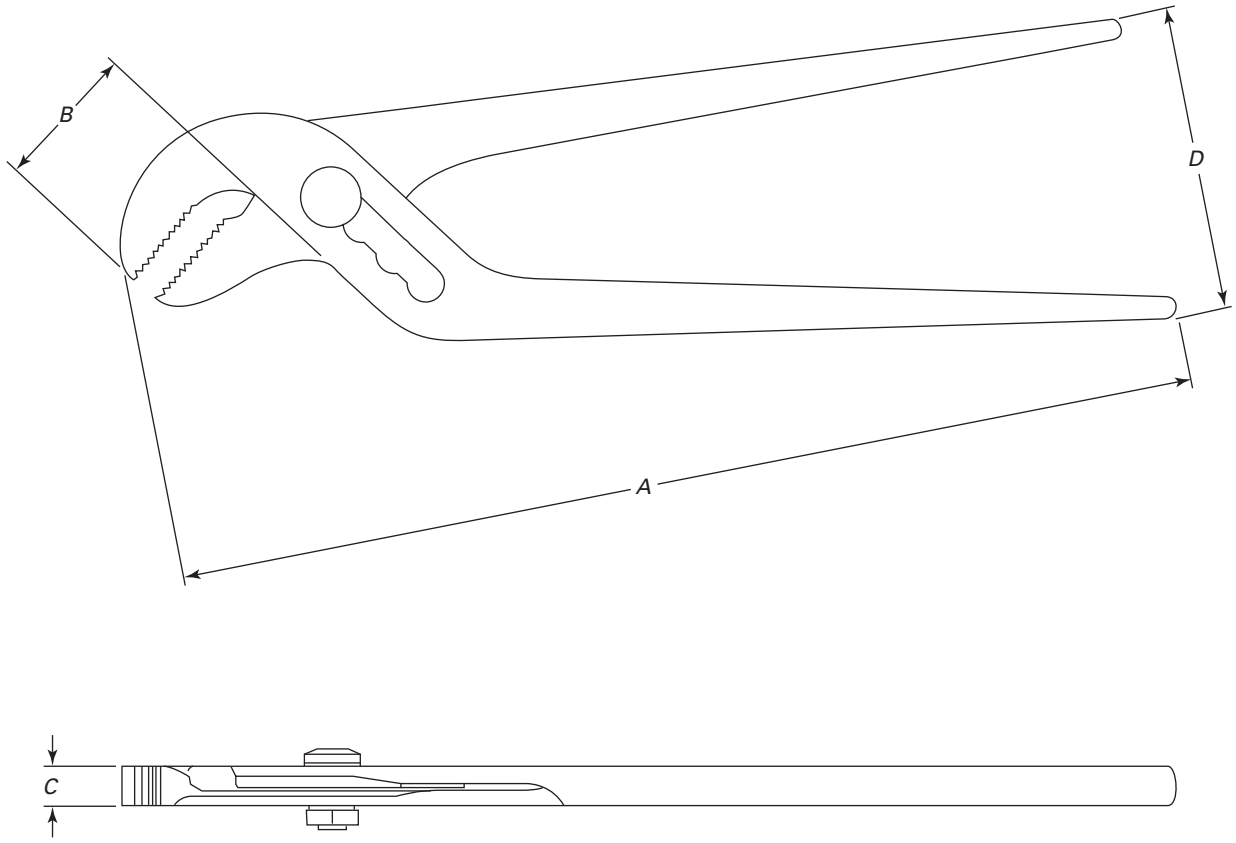


Fig. 5 Type I, Class 2: Adjustable Joint, Angle Nose, Multiple Holes



标准分享网 www.bzfxw.com 免费下载

Fig. 6 Type II, Class 1, Style A: Slip Joint, Combination Jaw, Straight Nose, Regular

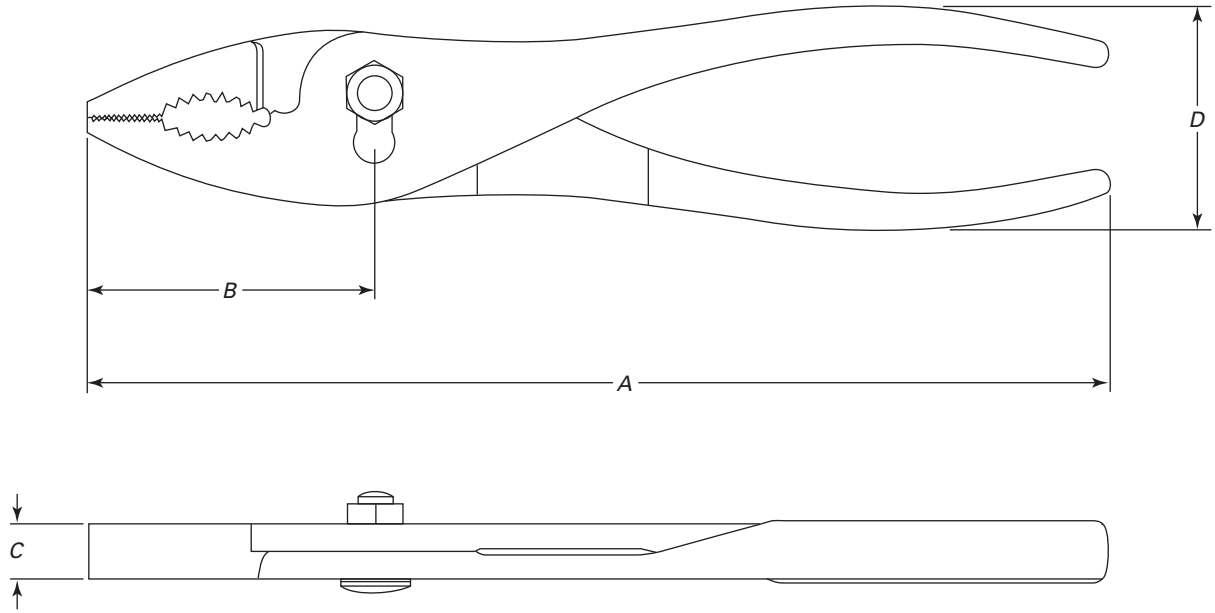


Fig. 7 Type II, Class 1, Style B: Slip Joint, Combination Jaw, Straight Nose, Thin

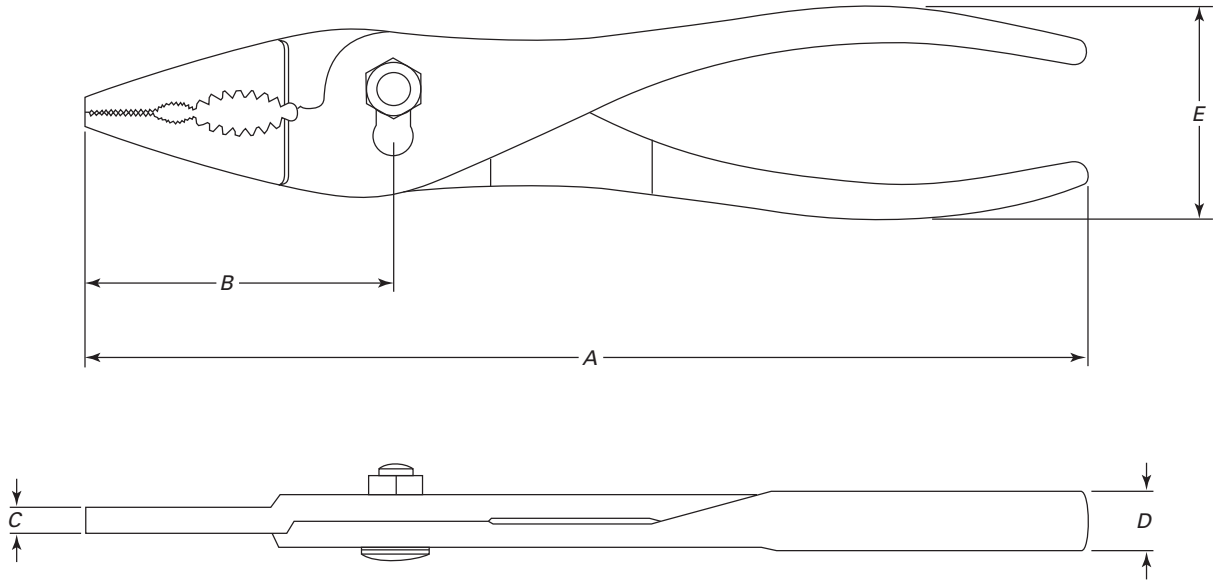
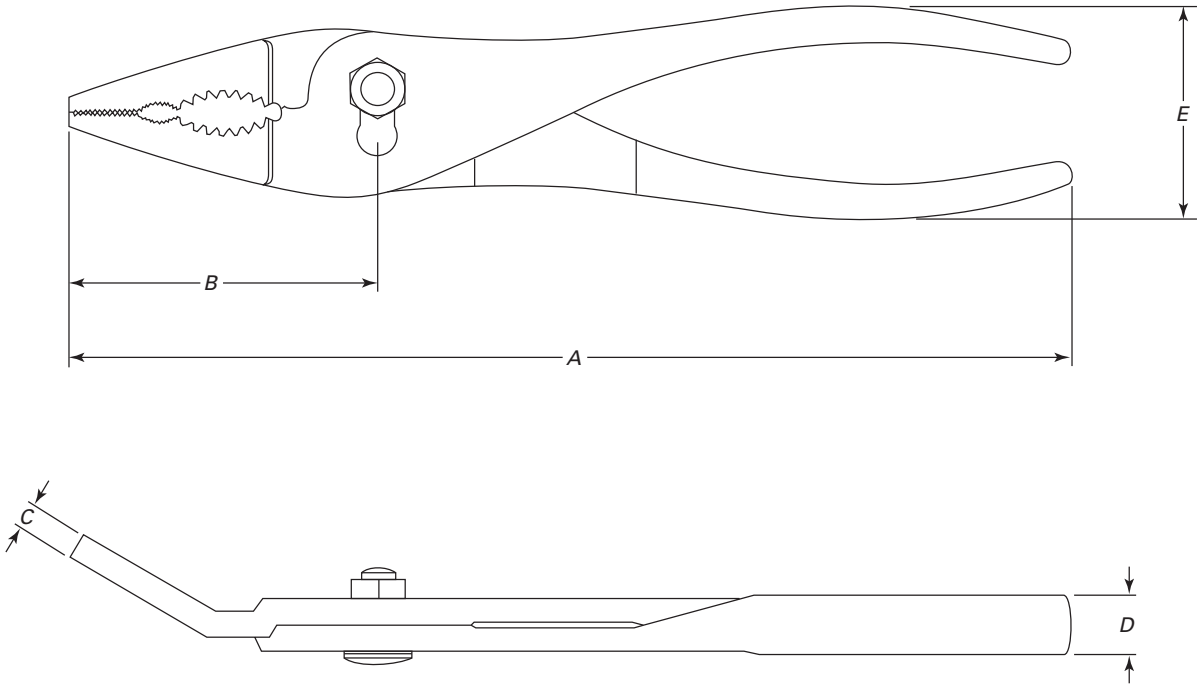


Fig. 8 Type II, Class 2: Slip Joint, Combination Jaw, Bent Nose



标准分享网 www.bzfxw.com 免费下载

Table 1 Type I, Class 1, Styles A, B, and D: Adjustable Joint, Angle Nose, Multiple Grooves, Tongue

Nominal Size	Overall Length, *A*		Jaw Length, *B*		Jaw Thickness, *C* [Note (1)]		Maximum Distance Between Outside of Handles With Jaw Parallel, *D*	Minimum Work Capacity With Jaws Parallel	Minimum Number of Adjustment Positions
	Min.	Max.	Min.	Max.	Min.	Max.			
4½	4.0	5.3	0.31	0.56	0.12	0.25	3.2	0.5	3
6½	6.0	7.2	0.69	0.88	0.25	0.41	3.2	0.7	4
8	7.5	8.5	0.87	1.06	0.25	0.41	3.2	1.0	4
9½	9.0	10.0	1.00	1.31	0.25	0.44	3.2	1.2	4
10	9.5	10.5	1.06	1.38	0.25	0.44	3.2	1.7	5
12	11.0	13.0	1.44	1.88	0.31	0.63	4.3	2.1	5
13	12.0	14.0	1.56	1.88	0.45	0.64	4.3	2.6	5
14	13.0	15.0	1.50	1.75	0.41	0.66	4.3	1.7	6
14½	13.5	15.5	1.63	2.00	0.47	0.63	4.3	2.8	7
16	15.0	17.0	2.12	2.50	0.44	0.63	5.5	3.7	8
20	19.0	21.0	2.87	3.25	0.44	0.63	5.5	5.3	10

NOTE:
(1) Measured 0.25 in. from the tip of jaw to provide for acceptance of tapered jaw.

Table 2 Type I, Class 1, Style C: Adjustable Joint, Angle Nose, Multiple Grooves, Tongue

Nominal Size	Overall Length, *A*		Jaw Length, *B*		Jaw Thickness, *C* [Note (1)]		Distance Between Handles, *D*	Minimum Work Capacity With Jaws Parallel	Number of Adjustment Positions
	Min.	Max.	Min.	Max.	Min.	Max.			
10	9.5	10.5	1.0	1.4	0.31	0.56	4.3	1.0	4
14	13.0	15.0	1.5	1.8	0.41	0.66	4.3	1.7	6

NOTE:
(1) Measured 0.25 in. from the tip of jaw to provide for acceptance of tapered jaw.

Table 3 Type I, Class 2: Adjustable Joint, Angle Nose, Multiple Holes

Nominal Size	Overall Length, *A*		Jaw Length, *B*		Jaw Thickness, *C*		Maximum Distance Between Handles With Jaws Parallel, *D*	Minimum Work Capacity	Minimum Number of Adjustment Positions
	Min.	Max.	Min.	Max.	Min.	Max.			
5	4.5	5.5	0.3	1.0	0.06	0.25	3.2	0.37	2
7	6.5	7.5	0.6	1.0	0.28	0.50	3.2	0.63	3
8	7.8	8.5	1.0	1.5	0.28	0.50	3.2	1.00	4
10	9.0	11.0	1.2	2.0	0.25	0.44	3.2	1.37	4

GENERAL NOTE: For plain handles without comfort grips.

Table 4 Type II, Class 1, Style A: Slip Joint, Combination Jaw, Straight Nose, Regular

	Overall Length, *A*		Jaw Length, *B*		Jaw Thickness, *C*		Handle Width, *D*	
Nominal Size	Min.	Max.	Min.	Max.	Min.	Max	Min.	Max.
4	3.0	5.0	1.0	1.5	0.22	0.41	1.1	1.8
6	5.0	7.0	1.5	2.0	0.28	0.50	1.3	2.2
8	7.0	9.0	1.5	2.2	0.28	0.50	1.5	2.3
10	9.0	11.0	2.0	2.7	0.28	0.66	1.7	2.5

Table 5 Type II, Class 1, Style B: Slip Joint, Combination Jaw, Straight Nose, Thin

	Overall Length, *A*		Jaw Length, *B*		Nose Thickness, *C*		Handle Thickness, *D*		Handle Width, *E*	
Nominal Size	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
6	5.7	6.8	1.5	2.0	0.16	0.25	0.31	0.56	1.3	2.2
8	7.7	8.8	1.6	2.2	0.16	0.25	0.31	0.66	1.5	2.3

Table 6 Type II, Class 2: Slip Joint, Combination Jaw, Bent Nose

	Overall Length, *A*		Jaw Length, *B*		Nose Thickness, *C*		Handle Thickness, *D*		Handle Width, *E*	
Nominal Size	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
6	5.7	6.8	1.4	2.0	0.16	0.25	0.31	0.56	1.3	2.2
8	7.7	8.8	1.5	2.1	0.16	0.25	0.31	0.66	1.5	2.3

标准分享网 www.bzfxw.com 免费下载

Table 7 Test Parameters

Type	Nominal Size	Test Torque, lbf-in.	Maximum Permanent Set
I	$4\frac{1}{2}$	250	0.03
I	5	250	0.03
I	$6\frac{1}{2}$	250	0.03
I	7	450	0.03
I	8	450	0.03
I	$9\frac{1}{2}$	750	0.03
I	10	750	0.03
I	12	850	0.03
I	13	850	0.03
I	14	850	0.03
I	$14\frac{1}{2}$	850	0.03
I	16	950	0.03
I	20	1,050	0.03
II	4	100	0.03
II	6	675	0.03
II	8	1,000	0.06
II	10	1,450	0.13

Table 8 Steel Wire Sizes for Wire Cut Test

Nominal Pliers Size	Wire Diameter
4	0.033–0.037
6	0.083–0.087
8	0.096–0.100
10	0.112–0.116

ASME B107.24

标准分享网 www.bzfxw.com 免费下载

PLIERS: LOCKING, CLAMP, AND TUBING PINCH-OFF

1 SCOPE

This Standard provides performances and safety requirements for locking pliers that are suitable for gripping, clamping, pinching, and wrenching. Some of the locking wrench pliers are provided with cutters. Inclusion of dimensional and functional 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.

2 DEFINITIONS

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

3 REFERENCE

The following publication is referenced in this Standard.

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

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

4 CLASSIFICATIONS

Type I: locking pliers
- *Class 1:* straight jaws
- *Class 2:* curved jaws
- *Class 3:* long nose
- *Class 4:* smooth jaws
  - Style A: without cutter
  - Style B: with cutter

Type II: clamp
- *Class 1:* "C" clamp
  - Style A: fixed without swivel pads
  - Style B: fixed with swivel pads
- *Class 2:* sheet metal clamp
- *Class 3:* welding clamp

Type III: tubing pinch-off

5 PERFORMANCE REQUIREMENTS

Illustrations shown herein are descriptive and not restrictive and are not intended to preclude the manufacture of pliers that are otherwise in accordance with this Standard. Dimensions shall be determined by measuring the pliers with jaws in the closed and locked position. The overall length measurement shall include the adjusting screw. Table values are in inches unless otherwise specified.

Pliers shall pass applicable tests in section 6.

5.1 Design

Pliers shall be similar to the figure to which reference is made and shall be proportioned in all parts so as to meet the requirements of this Standard. Pliers shall be provided with a toggle or cam device having an adjustable mechanism designed so that the jaws can be clamped and locked. Pliers shall be released by hand anywhere within the capacity of the pliers by any release mechanism similar to Fig. 1. Test specimens shall withstand applicable test procedures without cracking or breaking.

5.1.1 Type I, Locking Pliers. Adjustments in the jaw opening shall be made by the adjusting screw. Pliers shall have straight, curved, long nose, or bent nose jaws. Pliers shall be capable of withstanding the locking/load test specified in para. 6.3. Pliers shall have one fixed jaw and one adjustable jaw. The jaws shall be integral with or securely fixed to the pliers. There shall be no motion of the gripping surface of either jaw other than that produced by manual operation of the pliers. The design of the toggle or cam mechanism shall be such that when the movable handle is released from the closed and locked position, the jaw tips shall move apart to the full open position.

5.1.1.1 Class 1, Straight Jaws. The gripping surface of Class 1 jaws shall be serrated with sharp teeth of such form as to securely hold a work object with a positive grip. Pliers shall be capable of withstanding the grip test of para. 6.4.1. Style A pliers shall have two straight jaws and conform to the requirements shown in Table 1 for the size specified and shall be similar to Fig. 2.

5.1.1.2 Class 2, Curved Jaws. Class 2 pliers shall have straight, serrated gripping surfaces at the outer end of the jaws suitable for gripping flat surfaces and curved gripping jaws with sharp teeth at the center of the jaw suitable for gripping round surfaces. Pliers shall be capable of withstanding the grip test of para. 6.4.1.

(a) Style A, Without Cutter. Style A pliers shall conform to the requirements shown in Table 2 for the size specified and shall be similar to Fig. 3.

(b) Style B, With Cutter. Style B pliers shall be identical to Style A pliers except that the pliers shall be provided with cutting edges near the joint. Pliers shall cut wire in accordance with para. 6.2. Pliers shall conform to the requirements shown in Table 3 for the sizes specified and shall be similar to Fig. 3.

5.1.1.3 Class 3, Long Nose

(a) Style A, Without Cutter. Pliers shall have straight, serrated gripping surfaces at the outer end of the jaws suitable for gripping flat surfaces. The balance of the gripping surfaces may be straight or with curved gripping jaws with sharp teeth at the center of the jaw suitable for gripping round surfaces. Class 3, Style A pliers shall conform to the requirements shown in Table 4 and shall be similar to Fig. 4.

(b) Style B, With Cutter. Pliers shall have straight, serrated gripping surfaces at the outer end of the jaws suitable for gripping flat surfaces. The balance of the gripping surfaces may be straight or with curved gripping jaws with sharp teeth at the center of the jaw suitable for gripping round surfaces and shall be provided with cutting edges near the joint end. Pliers shall cut wire, as specified in para. 6.2. Class 3, Style B pliers shall conform to the requirements shown in Table 4 and be similar to Fig. 4.

5.1.1.4 Class 4, Smooth Jaws. Class 4 pliers shall have smooth jaw surfaces and shall be capable of holding, without marring the surface, parallel-sided material of a thickness up to the minimum jaw opening size. Pliers shall conform to the requirements shown in Table 5 and shall be similar to Fig. 5. Pliers shall be capable of withstanding the grip tests of para. 6.4.2.

5.1.2 Type II, Clamp. Pliers shall be capable of withstanding the load test specified in para. 6.3. The design of the toggle or cam mechanism shall be such that when the movable handle is released from the closed and locked position, the jaw tips shall move apart to the full open position.

5.1.2.1 Class 1, "C" Clamp, Style A, Fixed Without Swivel Pads. Jaws shall have radiused or lightly serrated clamping surfaces. Class 1, Style A pliers shall conform to the dimensions of Table 6 and shall be similar to Fig. 6. With the jaws closed and locked, a rectangular block of a size equal to dimensions *B* and *C* shall pass freely through the throat.

5.1.2.2 Class 1, "C" Clamp, Style B, Fixed With Swivel Pads. Jaws shall have smooth clamping surfaces that are moveable to facilitate parallel clamping throughout the clamping range. The clamp shall conform to the requirements in Table 7 and shall be similar to Fig. 7. With clamp jaws closed and locked, a rectangular block of a size equal to dimensions *B* and *C* shall pass freely through the throat.

5.1.2.3 Class 2, Sheet Metal Clamp. Jaws shall have enlarged clamping surfaces suitable for firmly holding sheet metal. The clamp shall conform to the requirements in Table 8 and shall be similar to Fig. 8.

5.1.2.4 Class 3, Welding Clamp. Jaws shall be "U" shaped and constructed with an open area in the center to permit welding, soldering, riveting, and similar operations, while the work is clamped. Class 3 clamps shall conform to the requirements in Table 9 and shall be similar to Fig. 9.

5.1.3 Type III, Tubing Pinch-Off. Pliers shall be capable of withstanding testing in accordance with para. 6.6. With the pliers in the closed and locked position, the jaw tips shall make contact, and the remainder of jaw contact surface shall be such that a 0.005-in. thickness gage cannot be inserted through the closed jaws. The throat depth shall be a minimum of 0.750 in. Pliers shall conform to Table 10 and shall be similar to Fig. 10.

5.2 Materials

The materials used in the manufacture of the pliers shall be such as to produce pliers conforming to this Standard.

5.3 Handles

Handles of pliers shall be through hardened from 30 HRC to 50 HRC or case hardened from 75 HR15N to 86 HR15N with a case depth of a minimum of 0.010 in. Handles shall be shaped to afford a comfortable grip and shall be free from rough edges and sharp corners. The minimum handle clearance between the fixed and moveable handle shall be as specified in the appropriate tables, when the pliers are locked in any position of the jaws. Outer hand-gripping surfaces of handles shall be smooth, knurled, or impressed.

5.4 Joints

Joints shall have no excessive looseness, play, or any other indications of side play of the two halves of the pliers when opened or closed that would impair the function of pliers. Joint fasteners shall be through hardened from 25 HRC to 50 HRC. Where fasteners receive a case-hardening treatment in addition to the through hardening, a maximum hardness of 60 HRC or equivalent will be permitted.

5.5 Jaws

5.5.1 Jaw Openings. Ends of jaws shall open, when adjusted by the screw, to the respective minimum distance specified in Tables 1 through 5 for Type I pliers and through the clamping range in Tables 6 through 9 for Type II pliers. Jaws shall open and close in a smooth and uniform manner.

标准分享网 www.bzfxw.com 免费下载

5.5.2 Jaw Hardness. Jaws of Type I pliers shall be through hardened from 45 HRC to 60 HRC or case hardened from 83 HR15N to 90 HR15N with a case depth minimum of 0.010 in. Jaws of Type II pliers shall be through hardened from 35 HRC to 50 HRC or case hardened from 83 HR15N to 90 HR15N with a case depth minimum of 0.010 in. Swivel pads need not be hardened.

5.5.3 Jaw Serration. Serrated surfaces for Type I, Classes 1, 2, and 3 shall have continuous and uniform sharp projections.

5.6 Adjusting Screw

An adjusting screw located at the end of the handle shall have a minimum hardness of 30 HRC.

5.7 Marking

Pliers shall be marked in a plain and permanent manner with the manufacturer's name or trademark. Marking shall be as permanent as the normal life expectancy of the pliers, providing the surface to which it was applied has not been subjected to a fretting or abrading action, and be capable of withstanding the cleaning normally experienced during its intended use.

5.8 Finish

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

5.9 Spring

The spring shall be capable of opening the jaws to the respective minimum jaw opening tip-to-tip dimension as specified in the tables for the individual type and class of pliers.

6 TESTS

WARNING: Many tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be employed in conducting these tests. These tests are designed to evaluate the tools and materials and do not condone the use of the tools in an environment, or in a manner, inconsistent with safe use of the tools.

6.1 Hardness Test

Hardness shall be tested per ASME B107.25, para. 4.3.

6.2 Cut Test for Type I, Class 2, Style B and Class 3, Style B

The 4¼-in., 5½-in., and 5¼-in. pliers shall cut 0.048-in. ± 0.003-in. diameter steel wire without readjusting the pliers. Force (applied to the end of the movable handle) required to lock the toggle mechanism and complete the cut shall not exceed 35 lbf. The 6½-in., 7-in., 8½-in., and 10-in. pliers shall cut 0.091-in. ± 0.003-in. diameter steel wire in not more than three progressive adjustments. Force (applied to the end of the movable handle) required to lock the toggle mechanism in making each progressive cut shall not exceed 70 lbf. Steel wire used in these tests shall have a minimum tensile strength of 200,000 psi. Deformation or breakage of any part of the pliers shall be cause for rejection.

6.3 Locking/Load Test

Pliers shall be tested on a system capable of applying the required minimum test load given in Table 11. The pliers' handles shall be locked, using the maximum value shown in Table 11. Test load shall be applied to the jaw tips in a direction to spread the jaw-clamping surfaces apart for a minimum of 10 sec. Pliers shall remain locked while the load is applied. Pliers shall have passed the test if the jaw tips close and all the joints and adjusting screw work properly after removal of the load.

6.4 Jaw Grip Test

6.4.1 Jaw Grip Test, Type I, Classes 1, 2, and 3. Pliers shall be tested on both round and hexagonal steel mandrels. Pliers shall withstand the test torque specified in Table 12. The mandrels shall be gripped at the center of the jaws such that the axis of the mandrel is parallel to the axis of the joint fastener. The hexagonal mandrel shall be gripped across corners. A locking load of 30 lbf to 35 lbf shall be applied to the end of the movable handle to lock the toggle mechanism. When the torque is applied, the mandrel shall not turn in the jaws. Deformation or breakage of any part of the pliers shall be cause for rejection.

6.4.2 Jaw Grip Test, Type I, Class 4. Pliers shall be tested by gripping two pieces of rolled commercial brass 0.13 in. thick by approximately 0.88 in. wide by 6 in. long and a hardness from 56 HRB to 61 HRB. With the ends overlapping approximately 0.50 in., the two pieces of brass shall be gripped with the pliers under load. A locking load from 30 lbf to 35 lbf shall be applied to the end of the movable handle to lock the toggle mechanism. The free ends of the brass shall then be secured in a test apparatus. When the pull is applied to the free ends, slippage shall not occur prior to an applied load of 155 lbf.

6.5 Jaw Clearance Test, Type I, Class 2

A test shall be performed in the deepest part of the jaw arc using the GO/NO-GO criteria in Table 13. Pliers shall be in the closed and locked position. This test shall be performed after the test specified in para. 6.4.1.

6.6 Pinch-Off Test — Type III

Pliers shall be tested using the following procedure:

(a) Fit a 0.25-in. outside diameter soft copper tube with a 0.030-in. wall thickness onto an air line having an air pressure of 95 psig to 100 psig.

(b) Place the copper tube between the jaws of the pliers no less than 0.5 in. from the free end of the tube. Apply 70 lbf to 75 lbf to the end of the movable handle to close the pliers. With air pressure of 95 psig to 100 psig applied to one end of the tube, immerse the other end of the tube and the pliers in water.

(c) Pliers shall seal the tube by pinching off the air supply and remain locked on the tube. Pliers shall have passed the test if no bubbles appear within 1 min.

7 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

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

标准分享网 www.bzfxw.com 免费下载

Fig. 1 Typical Release Mechanisms for Locking Pliers

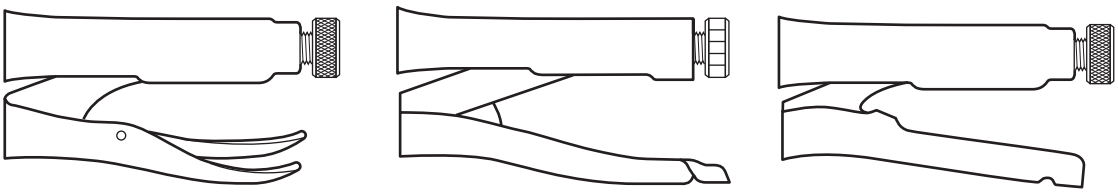


Fig. 2 Type I, Class 1, Style A, Straight Jaw Without Cutter

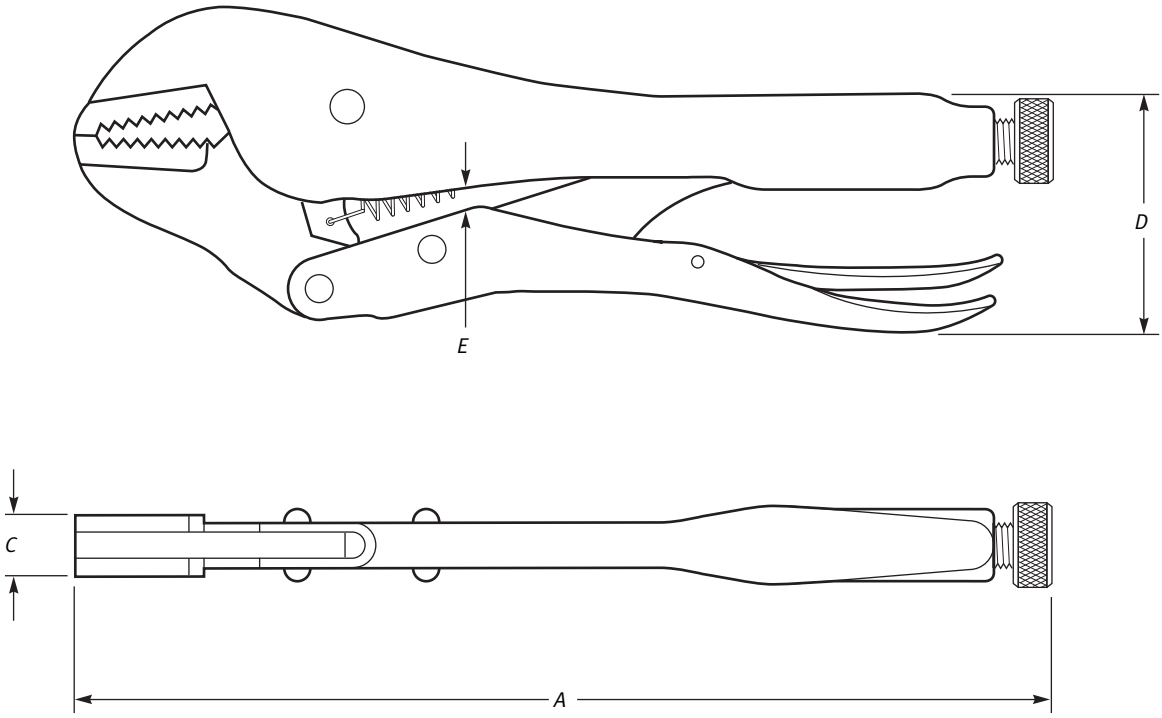


Fig. 3 Type I, Class 2, Styles A and B, Curved Jaw Without and With Cutter (Style B Shown)

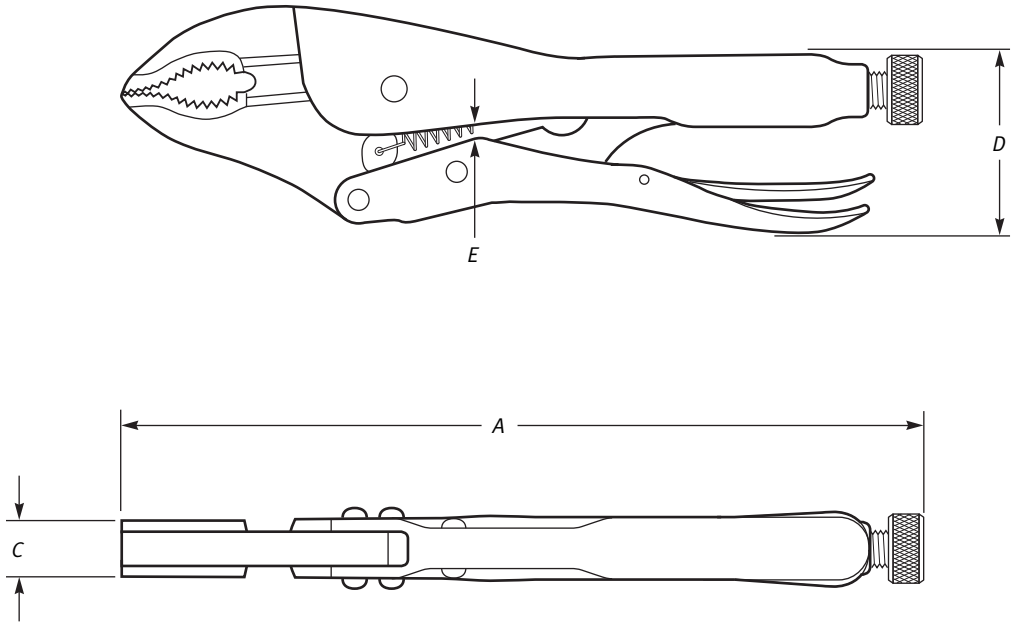
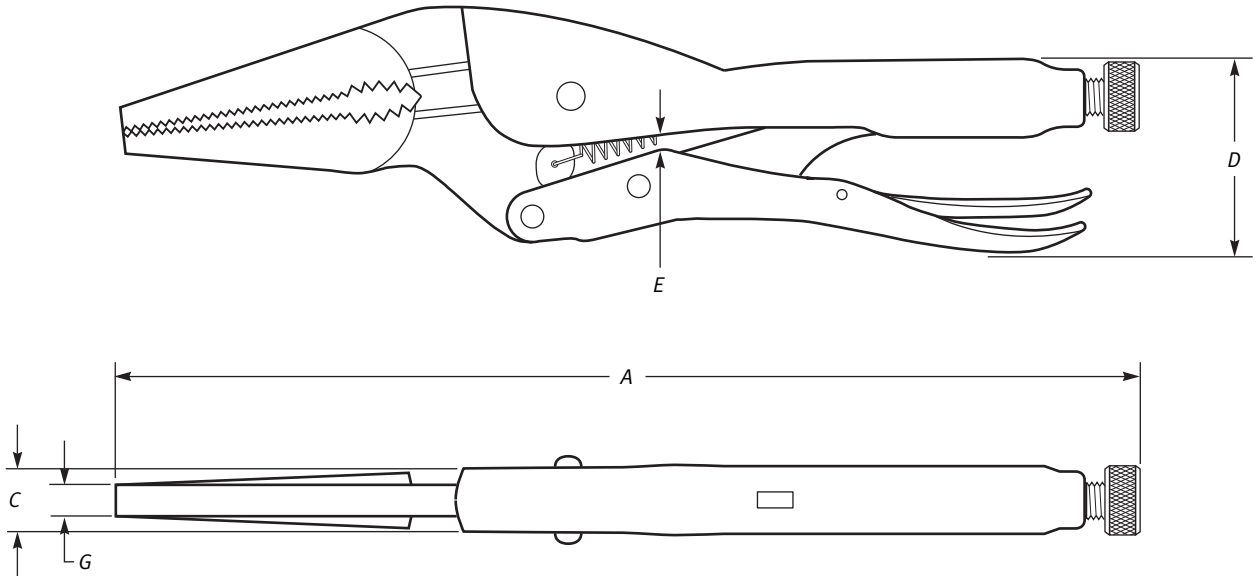


Fig. 4 Type I, Class 3, Styles A and B, Long Nose With and Without Cutter (Style B Shown)



标准分享网 www.bzfxw.com 免费下载

Fig. 5 Type I, Class 4, Style A, Smooth Jaw Without Cutter

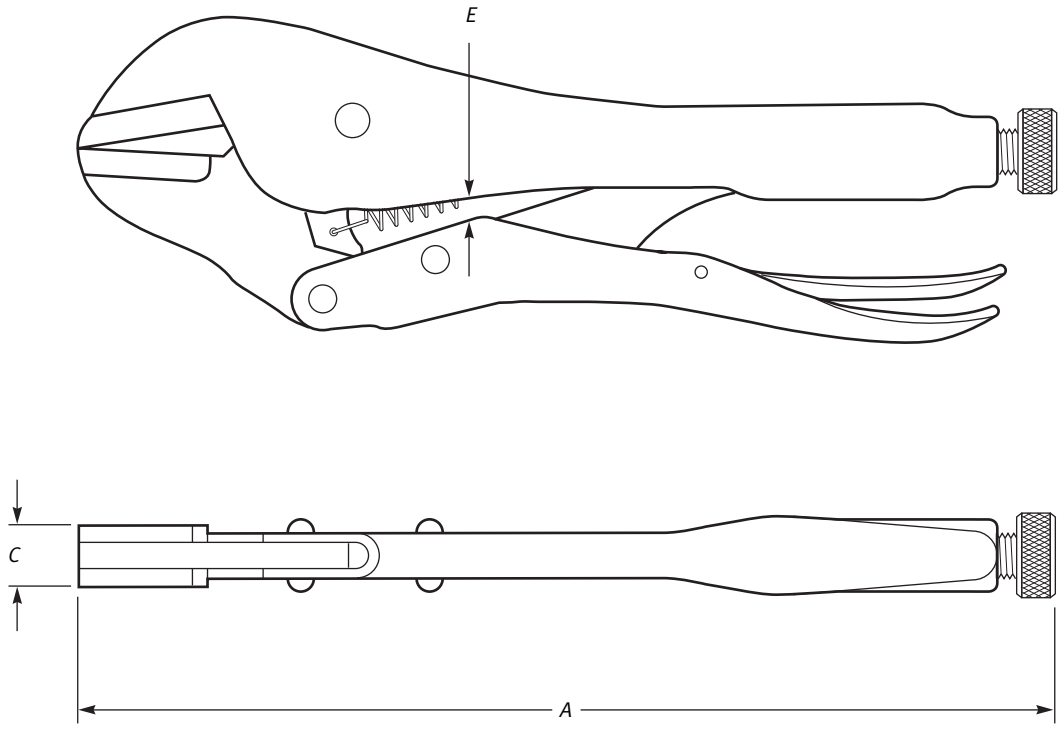


Fig. 6 Type II, Class 1, Style A, "C" Clamp, Fixed Without Swivel Pads

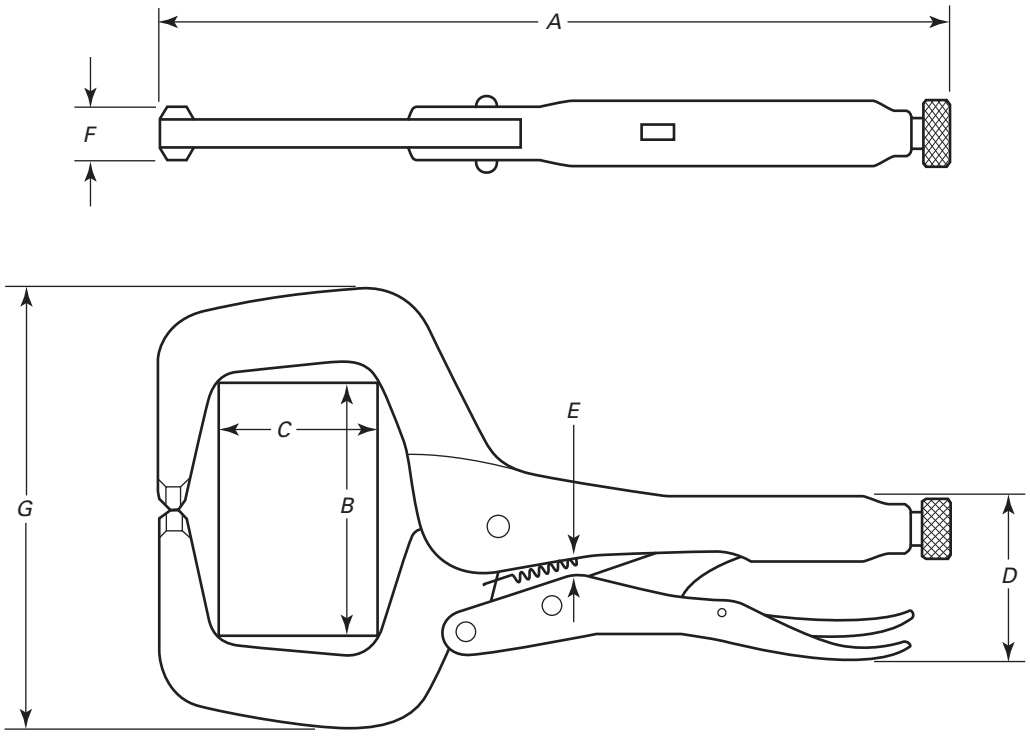


Fig. 7 Type II, Class 1, Style B, “C” Clamp, Fixed With Swivel Pads

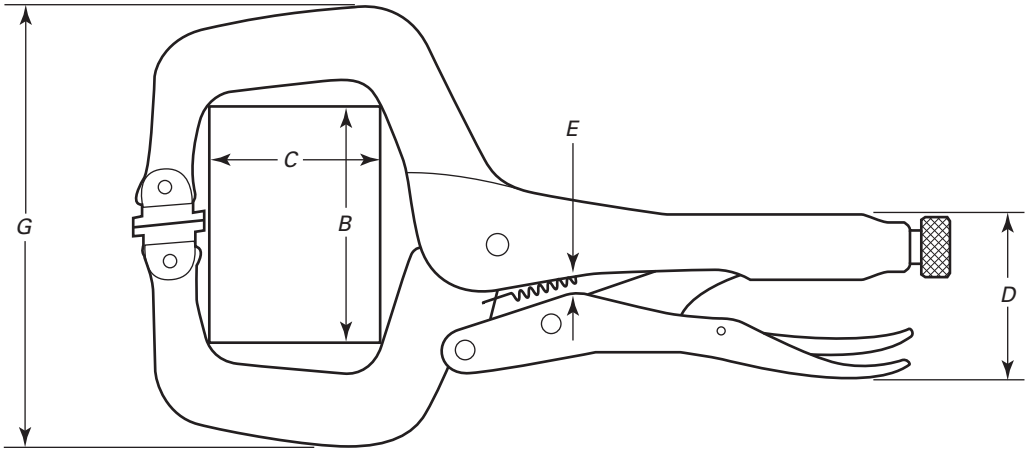
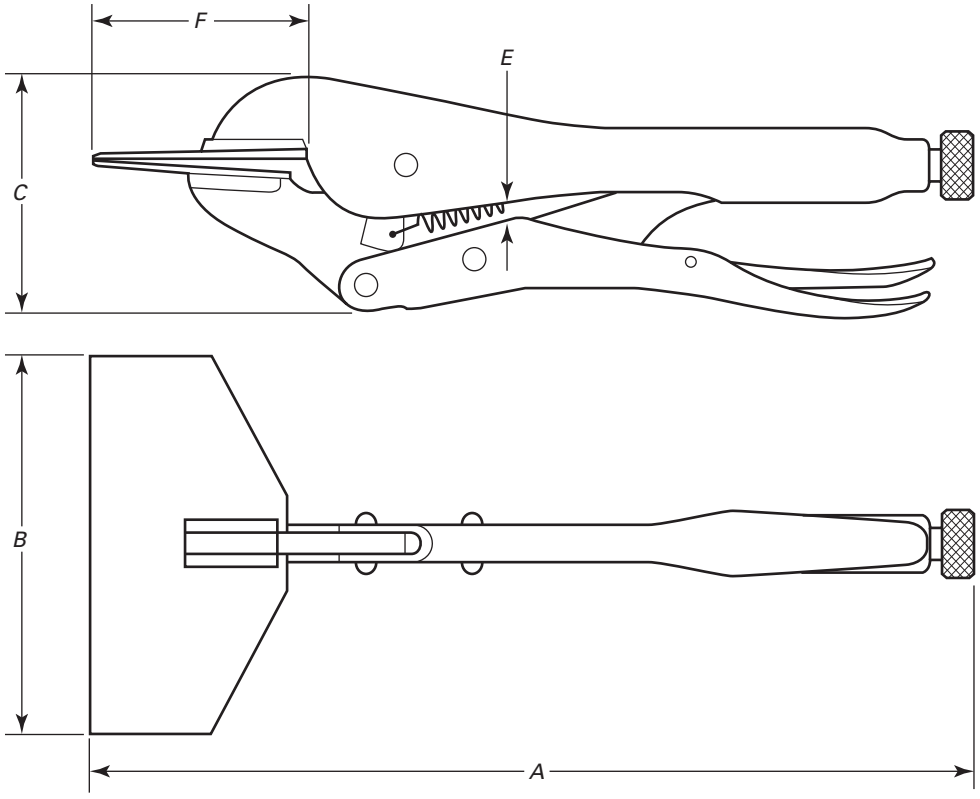


Fig. 8 Type II, Class 2, Sheet Metal Clamp



标准分享网 www.bzfxw.com 免费下载

Fig. 9 Type II, Class 3, Welding Clamp

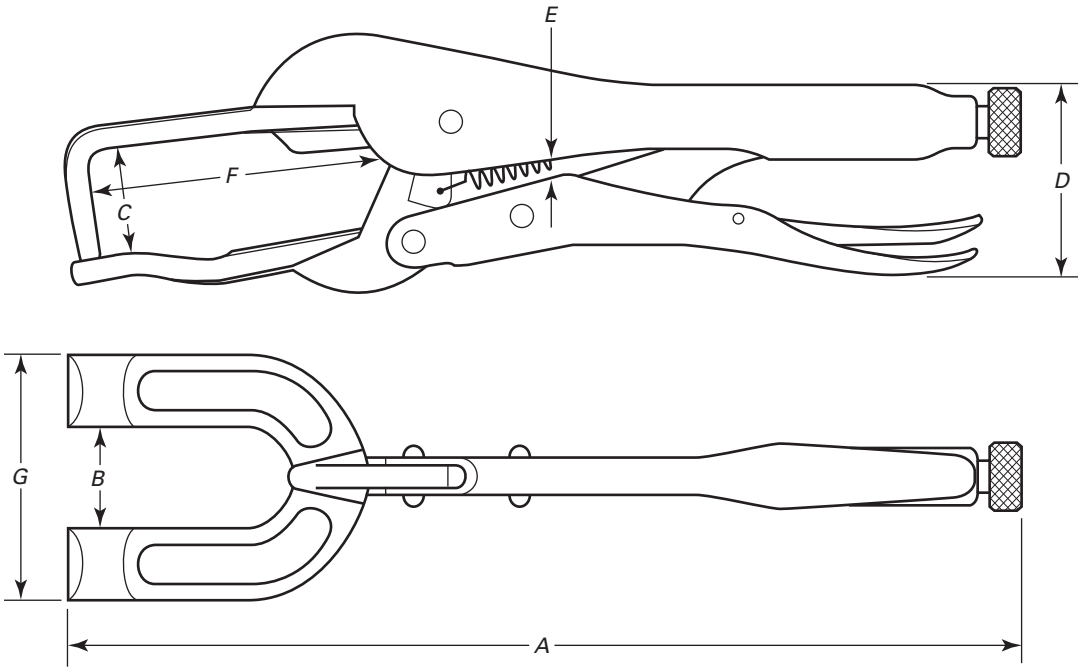


Fig. 10 Type III, Tubing Pinch-Off

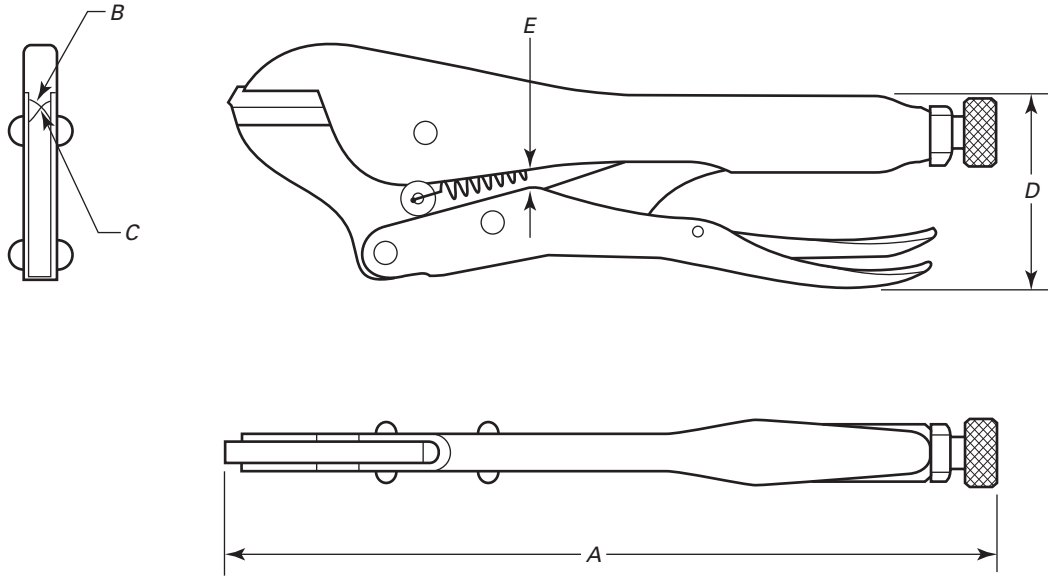


Table 1 Type I, Class 1, Style A, Straight Jaw Without Cutter

Nominal Size	Overall Length, *A*, ±0.63	Maximum Jaw Tip Thickness, *C*	Maximum Handle Width, *D*	Minimum Handle Clearance, *E*	Minimum Jaw Opening Tip-to-Tip	Jaw Opening at Parallel Position, ±0.13
5½	5.5	0.57	2.00	0.09	1.13	0.38
7	7.0	0.57	2.38	0.16	1.31	0.56
8½	8.5	0.76	2.50	0.16	1.75	0.63
10	10.0	0.76	2.63	0.19	1.88	0.69

Table 2 Type I, Class 2, Style A, Curved Jaw Without Cutter

Nominal Size	Overall Length, *A*, ±0.63	Maximum Jaw Thickness, *C*	Maximum Handle Width, *D*	Minimum Handle Clearance, *E*	Minimum Jaw Opening Tip-to-Tip
5½	5.50	0.35	1.88	0.09	1.13
7	7.00	0.38	2.26	0.16	1.50
8½	8.50	0.48	2.38	0.16	1.88
10	10.00	0.56	2.50	0.19	2.00

Table 3 Type I, Class 2, Style B, Curved Jaw With Cutter

Nominal Size	Overall Length, *A*, ±0.63	Maximum Jaw Thickness, *C*	Maximum Handle Width, *D*	Minimum Handle Clearance, *E*	Minimum Jaw Opening Tip-to-Tip
4¼	4.25	0.29	1.69	0.09	1.00
5½	5.50	0.35	1.88	0.09	1.13
7	7.00	0.38	2.26	0.16	1.50
8½	8.50	0.48	2.38	0.16	1.88
10	10.00	0.56	2.50	0.19	2.00

Table 4 Type I, Class 3, Styles A and B, Long Nose With and Without Cutter

Nominal Size	Overall Length, *A*, ±0.50	Maximum Jaw Thickness, *C*	Maximum Handle Width, *D*	Minimum Handle Clearance, *E*	Tip Width, *G*, ±0.10	Minimum Jaw Opening Tip-to-Tip
5¼	5.25	0.41	1.56	0.09	0.13	1.50
6½	6.50	0.47	1.75	0.09	0.16	2.00
8½	8.50	0.56	2.13	0.16	0.19	2.75
10	10.00	0.60	2.50	0.16	0.25	3.00

Table 5 Type I, Class 4, Style A, Smooth Jaw Without Cutter

Nominal Size	Overall Length, *A*, ±0.63	Maximum Jaw Thickness, *C*	Maximum Handle Width, *D*	Minimum Handle Clearance, *E*	Minimum Jaw Opening Tip-to-Tip	Jaw Opening at Parallel Position ±0.13
5½	5.5	0.57	2.00	0.09	1.13	0.38
7	7.0	0.57	2.38	0.16	1.31	0.56
8½	8.5	0.76	2.50	0.16	1.75	0.63
10	10.0	0.76	2.63	0.19	1.88	0.69

标准分享网 www.bzfxw.com 免费下载

Table 6 Type II, Class 1, Style A, "C" Clamp, Fixed Without Swivel Pads

Nominal Size	Overall Length, *A*, ±1.00	Minimum Throat Width, *B*	Minimum Throat Depth, *C*	Handle Width, *D*, ±0.25	Minimum Handle Clearance, *E*	Jaw Width, *F*, ±0.13	Height, *G*, ±1.00	Minimum Clamping Range
6	6.50	1.5	1.25	1.5	0.09	0.38	3.50	0–2.00
11	10.50	3.0	2.25	2.0	0.16	0.50	5.50	0–3.38

Table 7 Type II, Class 1, Style B, "C" Clamp, Fixed With Swivel Pads

Nominal Size	Overall Length, *A*, ±1.00	Minimum Throat Width, *B*	Minimum Throat Depth, *C*	Handle Width, *D*, ±0.25	Minimum Handle Clearance, *E*	Pad Width, *F*, ±0.13	Height, *G*, ±1.00	Minimum Clamping Range
5	5.25	1.38	0.90	1.31	0.09	0.63	2.75	0–1.50
6	6.50	1.50	1.13	1.50	0.09	0.88	3.50	0–2.00
11	10.50	3.00	2.25	2.00	0.16	1.13	5.50	0–3.38

Table 8 Type II, Class 2, Sheet Metal Clamp

Nominal Size	Overall Length, *A*, ±0.63	Clamp Width, *B*, ±0.13	Height, *C*, ±0.38	Handle Width, *D*, ±0.38	Handle Clearance, *E*	Clamp Depth, *F*, ±0.50	Minimum Clamping Range
8	7.75	3.13	2.25	1.75	0.16	1.75	0–0.50

Table 9 Type II, Class 3, Welding Clamp

Nominal Size	Overall Length, *A*, ±0.50	Inside Width, *B*, ±0.13	Inside Height, *C*, ±0.13	Handle Width, *D*, ±0.50	Minimum Handle Clearance, *E*	Inside Depth, *F*, ±0.50	Outside Width, *G*, ±0.13	Minimum Clamping Range
9	9.00	1	1	1.88	0.16	3.00	2.75	0–1.63

Table 10 Type III, Tubing Pinch-Off

Nominal Size	Overall Length, *A*, ±0.63	Top Jaw Radius, *B*, ±0.016	Bottom Jaw Radius, *C*, ±0.016	Handle Width, *D*, ±0.38	Minimum Handle Clearance, *E*
7	7.00	0.130	0.060	1.75	0.16

Table 11 Locking/Load Test for Types I and II

Classification	Nominal Size	Maximum Load to Lock Handles, lbf	Minimum Test Load on Jaw Tips, lbf
Type I Class 1	5½	45	900
Type I Class 1	7	45	2,500
Type I Class 1	8½	45	2,500
Type I Class 1	10	45	2,500
Type I Class 2	4¼	45	800
Type I Class 2	5½	45	900
Type I Class 2	7	45	2,500
Type I Class 2	8½	45	2,500
Type I Class 2	10	45	2,500
Type I Class 3	5¼	45	400
Type I Class 3	6½	45	450
Type I Class 3	8½	45	900
Type I Class 3	10	45	1,500
Type I Class 4	5½	45	900
Type I Class 4	7	45	2,500
Type I Class 4	8½	45	2,500
Type I Class 4	10	45	2,500
Type II Class 1	5	45	450
Type II Class 1	6	45	500
Type II Class 1	11	45	900
Type II Class 2	8	50	1,000
Type II Class 3	9	25	500

Table 12 Jaw Grip Test, Type I, Classes 1, 2, and 3

Nominal Size	Mandrel Size	Mandrel Hardness	Minimum Test Torque, lbf-in.
4¼	0.38 diam.	100 HRB max.	200
4¼	0.38 hex.	45-55 HRC	270
5½	0.50 diam.	100 HRB max.	225
5½	0.50 hex.	45-55 HRC	300
7	0.75 diam.	100 HRB max.	300
7	0.75 hex.	45-55 HRC	450
8½	0.75 diam.	100 HRB max.	480
8½	0.75 hex.	45-55 HRC	900
10	0.75 diam.	100 HRB max.	630
10	0.75 hex.	45-55 HRC	900

Table 13 Jaw Clearance Test, Type I, Class 2

Nominal Size	NO-GO Gage Diameter ± 0.003	GO Gage Diameter ± 0.003
4¼	0.203	0.141
5½	0.218	0.156
7	0.312	0.218
8½	0.375	0.281

标准分享网 www.bzfxw.com 免费下载

ASME B107.25

PLIERS: PERFORMANCE TEST METHODS

1 SCOPE

This Standard details the purpose, apparatus, procedures, and performance specifications for the functional testing of pliers and shears. It is intended to be used by manufacturers, purchasers, and other persons involved with evaluating these products. Test procedures described herein are used to evaluate conformance to performance requirements.

2 DEFINITIONS

copier paper: 20-lb 84-92 GE brightness grain long multipurpose paper, commonly used in photocopiers and laser printers.

deflection: movement under load.

force: the action of one body on another body that changes, or tends to change, the motion of the body acted on.

initial load: a small force applied to the pliers' handles during the hand load test prior to the major load.

jaw area: the portion of the pliers between the fastener (pivot point) and the cutting or gripping end.

load: mass or force, depending on use. A load that produces a force due only to gravity may be expressed in mass units. Any other load is expressed in force units.

major load: the force applied to the pliers' handles during the handle load test intended to deflect the handles.

may: see *shall, should, and may.*

moment: a measure of the tendency of a force to rotate a body upon which it acts about an axis.

permanent set: the difference in distance, measured at a right angle to the centerline, between handles before and after application and removal of the major load (also known as plastic deformation).

room temperature: 60°F to 80°F.

scored surface: serrated or crosshatched surface to enhance gripping ability.

shall, should, and may: 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. If a provision is of an optional or alternative nature, it is indicated by the word *may.*

3 REFERENCES

The following documents are referenced in this Standard. The latest edition shall be used.

ASTM D 3460, Standard Specification for White Watermarked and Unwatermarked Bond, Mimeo, Spirit Duplicator, Reprographic, and Laser Printer Cut-Sized Office Papers

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

ASTM E 384, Test Methods for Microhardness of Materials

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: The Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591 (www.hti.org)

SAE J1703, Motor Vehicle Brake Fluid

Publisher: Society of Automotive Engineers (SAE International), 400 Commonwealth Drive, Warrendale, PA 15096 (www.sae.org)

4 TESTS

Unless otherwise stated herein, all test shall be performed on finished pliers. All parameters, such as loads, permanent set, and wire properties, shall be defined in individual pliers standards.

WARNING: Many tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be employed in conducting these tests. These tests are designed to evaluate the tools and materials and do not condone the use of the tools in an environment, or in a manner, inconsistent with safe use of the tools.

4.1 Handle Load Test

4.1.1 Purpose. This test is used to measure the deflection and permanent set of the handles to ensure proper usability of the pliers.

4.1.2 Apparatus. The load application shall adquately support the pliers to ensure consistent loading and accurate measurement of handles' loads. A typical device appears in Fig. 1.

标准分享网 www.bzfxw.com 免费下载

4.1.3 Procedure. Remove comfort grips before testing. Apply loads perpendicular to the centerline of the handle opening (see Fig. 1) at the location specified in individual pliers' standards. Make a reference mark on the end of each handle for handle deflection and permanent set measurements. Apply the initial load of 5 lbf to the handles, and measure the distance between marks with the handles loaded (measurement #1). Apply the major load specified in individual pliers' standards, and measure the distance between the marks with the handles loaded (measurement #2). Reduce the handle load to 5 lbf, and measure the distance between the marks with the handles loaded (measurement #3). Calculate deflection by subtracting measurement #2 from measurement #1. Calculate permanent set by subtracting measurement #3 from measurement #1.

4.1.4 Specifications. Loading conditions, deflections, and permanent set requirements shall be in accordance with the applicable standard. Actual pounds force applied to the handles shall be calcluated by dividing the moment in lbf-in. by the distance from the center of the pivot to the point of load application.

4.2 Cut Tests

4.2.1 Wire Cut Test

(a) Purpose. This test is used to evaluate the ability of pliers to cut.

(b) Apparatus. The load application device shall adequately support the pliers to ensure consistent loading and accurate measurement of handles' loads during the wire cut test. A typical device is shown in Fig. 1.

(c) Procedure. Cut uncoated, single strand, steel wire without bending, pulling, or twisting. Position the wire at right angles to the cutting edge. Individual pliers' standards specify the handle loads, wire properties, and number and location of cuts.

4.2.2 Paper Cut Test

(a) Purpose. This test is used to determine whether the cutting capability of the pliers has been compromised due to deformation of the cutting edges during the preceding wire cut test.

(b) Apparatus. Any load application device conforming to the requirements of para. 4.2.1(b) may be used for this test.

(c) Procedure. Cut copier paper without any bending, pulling, or twisting. Use a maximum of 40 lbf (unless otherwise stated in the applicable standard) applied at the point of maximum handle curvature. The width of the paper shall be equal to the length of the cutting edges of the pliers +0/−0.06 in. The strip shall be centered between the ends of the cutting edges when the cut is made.

4.3 Pliers' Hardness Test

4.3.1 Purpose. This test is used to measure the hardness of the pliers and ensure proper performance of the product.

4.3.2 Apparatus. The apparatus for measuring hardness on pliers shall conform to ASTM E 18 or ASTM E 384.

4.3.3 Procedure. Rockwell hardness testing shall be performed in accordance with ASTM E 18 or ASTM E 384. Surface preparation may be necessary to ensure that the hardness of the substrate material is measured.

(a) Fastener. Pliers may be tested in the assembled condition using the Rockwell C scale on the finished exposed surface. The test mandrel shall be of small enough diameter to support the fastener only, which will prevent errors during the test due to looseness of the fastener in the pliers' body.

(b) Jaws. Pliers may be tested in the assembled condition using the Rockwell C scale on the finished exposed surface. The test mandrel shall be so shaped and/or the jaws properly prepared so that the area to be tested is adequately supported during the test to prevent errors resulting from movement of the pliers.

(c) Cutting Edges. Cutting edges shall have hardness readings measured using the Knoop or Vickers microhardness test in accordance with ASTM E 384. Microhardness test specimens shall be prepared by wet cutting a section perpendicular to the cutting surface at the midpoint of the length of the cutting edge. The specimen shall be mounted and polished in order to ensure good edge retention. Hardness measurements shall be taken within 0.005 in. of the cutting edge surface.

(d) Handles. Pliers may be tested in the assembled condition using the Rockwell C scale on the finished exposed surface. The test mandrel shall be so shaped and/or the handles properly prepared so that the area to be tested is adequately supported during the test to prevent errors resulting from movement of the pliers.

4.4 Joint Tests

4.4.1 Joint Integrity Test

(a) Purpose. This test is used to measure the joint's ability to resist loosening during normal use of the pliers.

(b) Apparatus. The apparatus shall adequately support the pliers to ensure consistent loading and accurate measurement of handles.

(c) Procedure. One handle of the pliers shall be clamped in a fixture. The load specified in the applicable standard shall be applied to the end of the unclamped handle in a direction parallel to the axis of the pivot, and the deflection of the unclamped pliers' handle shall be measured with a suitable measuring device. The same load shall then be applied in the opposite direction and a second measurement taken at the same location. The

total amount of deflection, divided by the distance from the axis of the pivot (center of fastener) to the point where the measurements were taken, shall not exceed the amount specified in the applicable standard.

4.4.2 Jaw Opening and Closing

(a) Purpose. This test evaluates the ability to open and close the jaws within specified force limits.

(b) Apparatus. The apparatus shall hold the pliers and include a suitable load-indicating device. A typical device is shown in Fig. 2.

(c) Procedure. One handle of the sample pliers under test shall be clamped in a vise with the pliers' handles in a horizontal plane, and a load shall be applied to the unclamped handle in such a direction as to open or close the jaws of the pliers. The load shall be applied in the plane of the handles by means of a suitable load-indicating device within 0.375 in. from the extreme end of the handle as shown in Fig. 2. The pliers' jaws shall open and close through the required minimum distance listed in the applicable standard, with a load not to exceed the specified maximum (also in the applicable standard).

4.5 Solvent Resistance Test

4.5.1 Purpose. This test is used to ensure that nonmetallic components have adequate resistance to solvents encountered during normal use.

4.5.2 Apparatus. Any suitable container for the solvent may be used. Care should be taken to provide adequate ventilation of solvent fumes.

4.5.3 Procedure. Solvents' tests shall be conducted at room temperature. The material being tested shall be fully immersed in the test fluids specified herein. New samples shall be used for each test fluid. Samples shall be immersed for 15 min to 20 min, removed, and allowed to dry for 24 hr to 28 hr. Test fluids are SAE J1703[1] brake fluid, gasoline, ethylene glycol, and ethyl alcohol. There shall be no significant swelling or surface attack of the material being tested. Comfort grips shall be tested while attached to the pliers' handles. Cushion grip throats, inserts, and sleeves that are not dependent on friction or adhesives for attachment may be tested separately.

5 SAFETY

Many of the tests described herein are inherently hazardous and, therefore, adequate safeguards for persons and property shall be employed when conducting these tests. Refer to the *Guide for Hand Tools — Selection, Saftey Tips, Proper Use and Care* for additional information.

[1] DOT3 and DOT4 brake fluid meet the requirements of SAE J1703.

标准分享网 www.bzfxw.com 免费下载

Fig. 1 Typical Apparatus for Applying Test Load to Handles of Pliers (Load Cell Measurement)

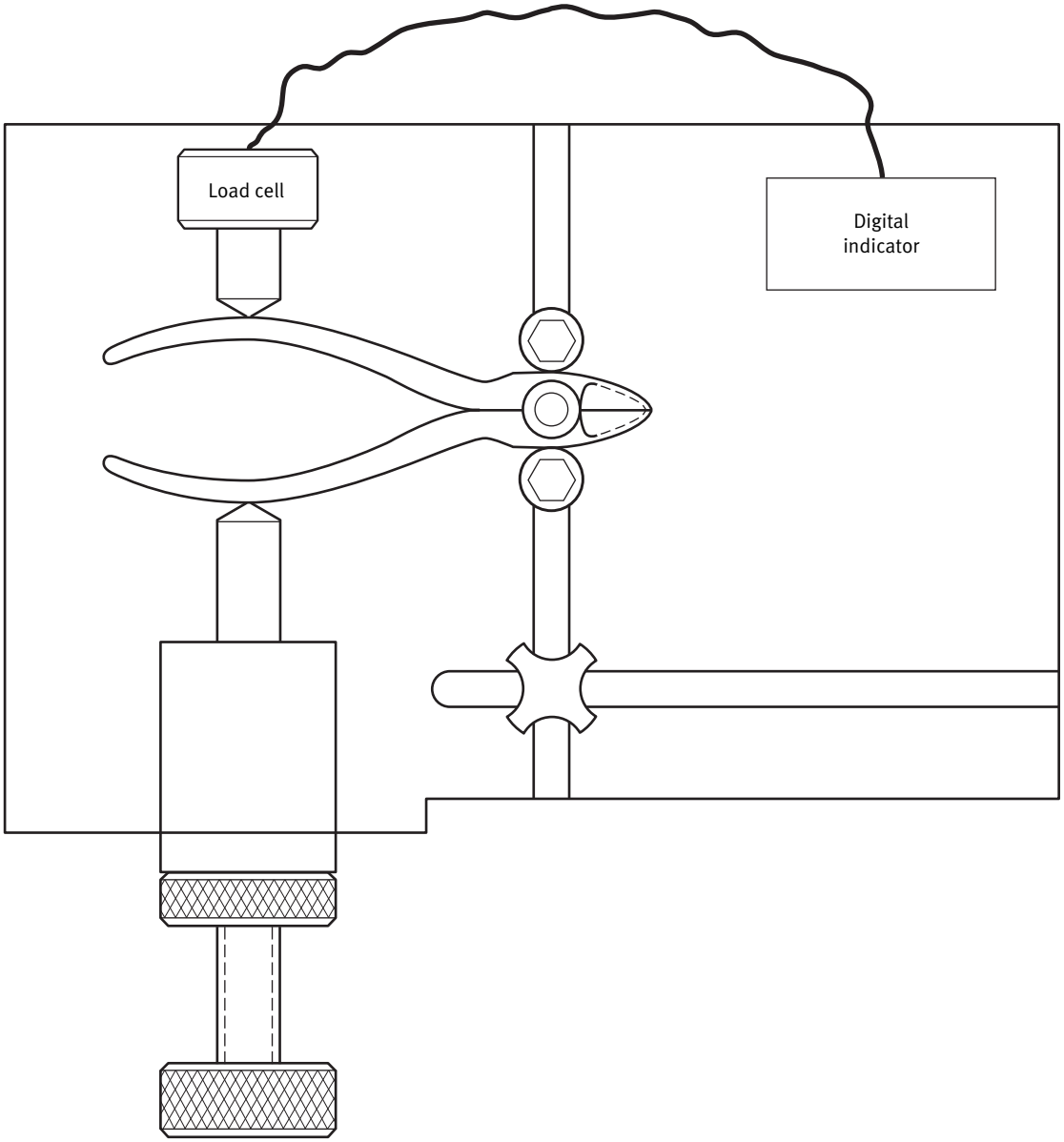
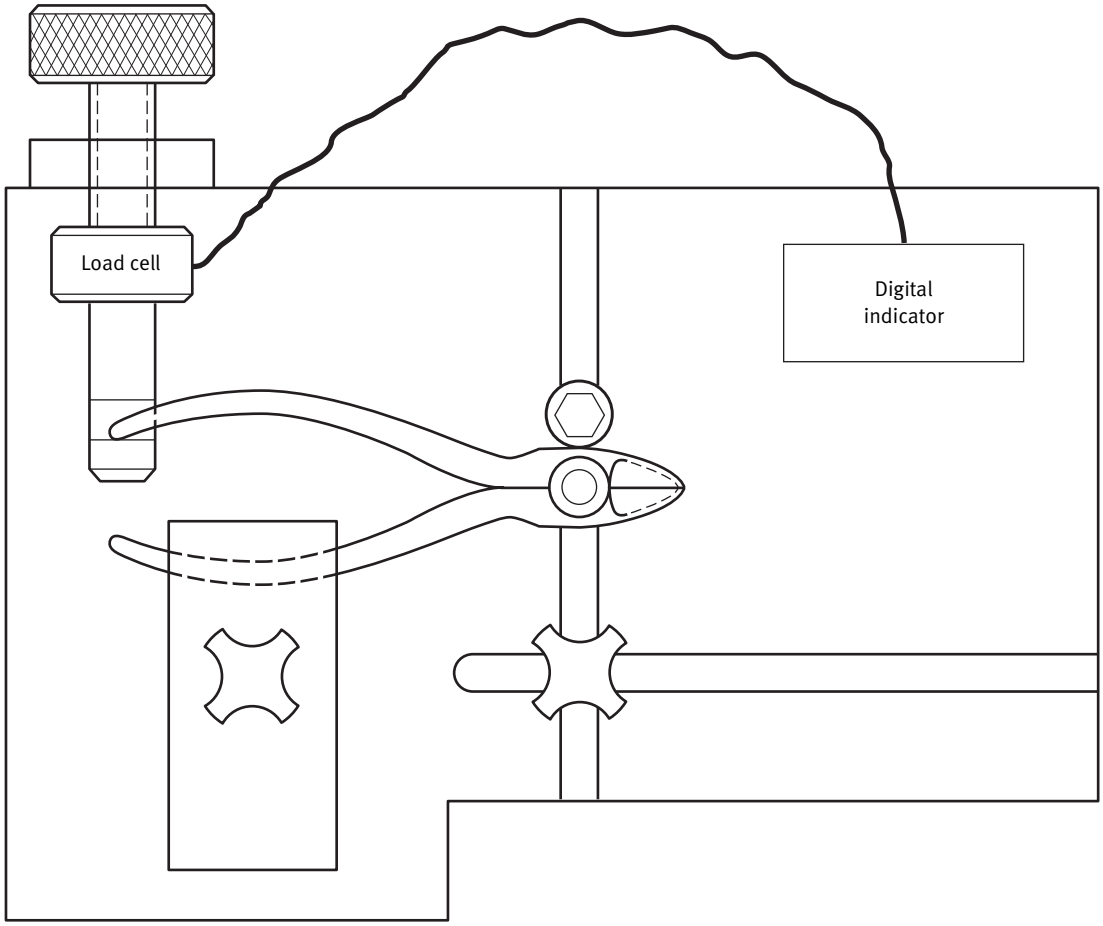


Fig. 2 Jaw Opening and Closing Test (Concept Design)



标准分享网 www.bzfxw.com 免费下载

ASME B107.27

PLIERS: MULTIPLE POSITION, ELECTRICAL CONNECTOR

1 SCOPE

This Standard provides performance and safety requirements for pliers (also known as Cannon Plug Pliers) that are used primarily for connecting or disconnecting threaded lock collars of electrical connectors. Inclusion of dimensional data in this Standard does not mean that all products described herein are stock production sizes. Consumers should 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 DEFINITIONS

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

3 REFERENCES

The following publications are referenced in this Standard. The latest edition shall be used.

ASTM D 2240, Test Method for Rubber Property — Durometer Hardness

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: The Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591 (www.hti.org)

4 CLASSIFICATIONS

Pliers, Multiple Position, Electrical Connector

5 PERFORMANCE REQUIREMENTS

The illustrations shown herein are descriptive and nonrestrictive and are not intended to preclude the manufacture of pliers that otherwise comply with this Standard.

5.1 Design

Pliers shall be suitable for loosening and tightening threaded lock collars of electrical connectors and shall be properly proportioned in all parts so as to be strong, durable, and easy to operate. Jaw sleeves or inserts shall be used to prevent marring of the gripping surface of collars. Jaw capacity shall be adjustable through a range of 0.75 in. to 2.5 in.

Pliers shall meet the dimensional requirements as shown in Figs. 1 and 2 and shall be capable of passing all tests in section 6.

5.2 Materials

The materials used in the manufacture of the pliers shall be such as to produce pliers conforming to this Standard.

5.3 Finish

Metallic surfaces shall have a rust preventive treatment and be free from pits, nodules, burrs, cracks, and other conditions that would adversely affect the performance or safety of the pliers. When provided, coatings shall be adherent and free from any condition 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 (provided 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 be shaped to provide a comfortable handgrip and shall be free from rough edges and sharp corners. Handles shall have a hardness of 38 HRC to 48 HRC. When comfort grips are furnished, they shall be made from a material capable of withstanding hard usage without deterioration, and shall pass the solvent test specified in para. 6.3. Comfort grips shall remain permanently attached under normal use of the tool. Unless specifically designed, labeled, and tested for such use, tools with comfort grips shall not be advertised

标准分享网 www.bzfxw.com 免费下载

or marked as having any nonconductive or electrically insulating properties.

5.6 Jaw Sleeve/Insert

The jaw sleeve/insert shall be made from a polymer of vinyl, nylon, or other durable composition with a durometer hardness of 73 to 95 on the Shore "A" scale per ASTM D 2240 and shall pass the tests per paras. 6.3 and 6.5.

5.7 Joint

Pliers shall be joined in a permanent manner through the use of a fastener. The joining method shall ensure uniform smooth movement through a respective number of adjustment positions. The fastener shall have a hardness of 25 HRC to 38 HRC, except when case hardened when a maximum hardness equivalent to 60 HRC shall be permitted.

5.8 Jaws

Jaws shall open to the required gripping range of 0.75-in. to 2.5-in. diameter, through which distance the tool shall operate in a smooth and uniform manner. Jaws shall have a hardness of 38 HRC to 48 HRC.

6 TESTS

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

6.1 Equipment

Equipment required for performing handle load requirement shall be of sufficient size as to test pliers through a gripping range of 0.75-in. to 2.5-in. diameter.

6.2 Handle Load Test

Pliers shall be tested per para. 4.1 of B107.25. A cylindrical mandrel from 0.75-in. to 2.5-in. diameter shall be used. After application of the initial load, the load to create a moment of 500 in.-lb shall be applied to the handle grip area for 10 sec. Permanent set of the handles shall not exceed 0.062 in.

6.3 Solvent Resistant Test

Nonmetallic components shall be tested per para. 4.5.1 of B107.25.

6.4 Hardness Test

Rockwell hardness specified herein shall be tested per para. 4.3 of B107.25.

6.5 Jaw Sleeve/Insert Test

Preload handles to prevent the $2\frac{1}{2}$-in. diameter mandrel from slipping on the sleeve/insert during the following test. Apply a torque of 200 lbf-in., minimum, to the mandrel (see Fig. 3). Maintain torque for 5 sec. Pliers shall not show any evidence of sleeve/insert slippage from its assembled position on the pliers.

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*.

Fig. 1 Pliers, Multiple Position, Minimum Capacity Position

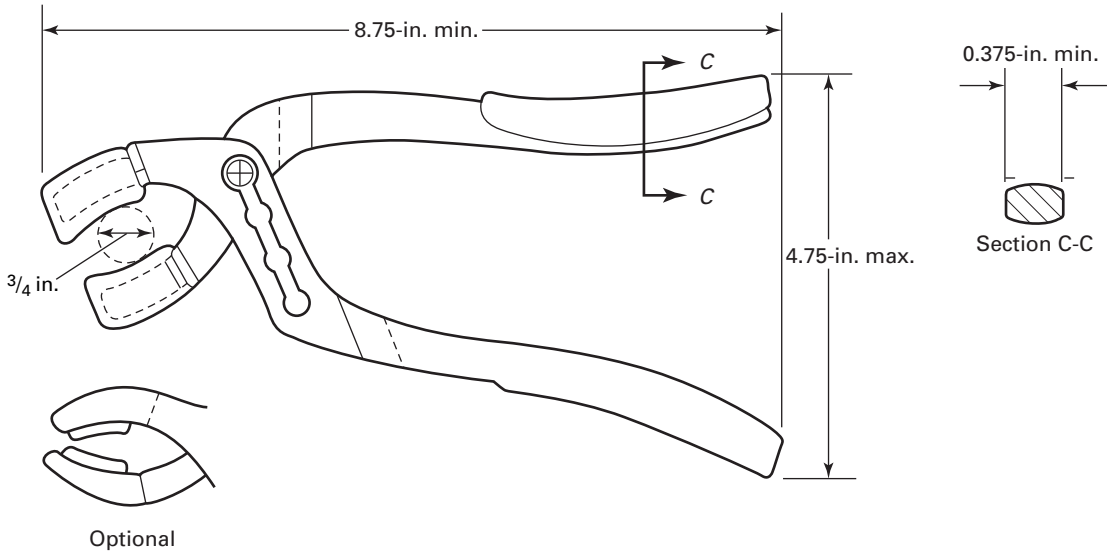
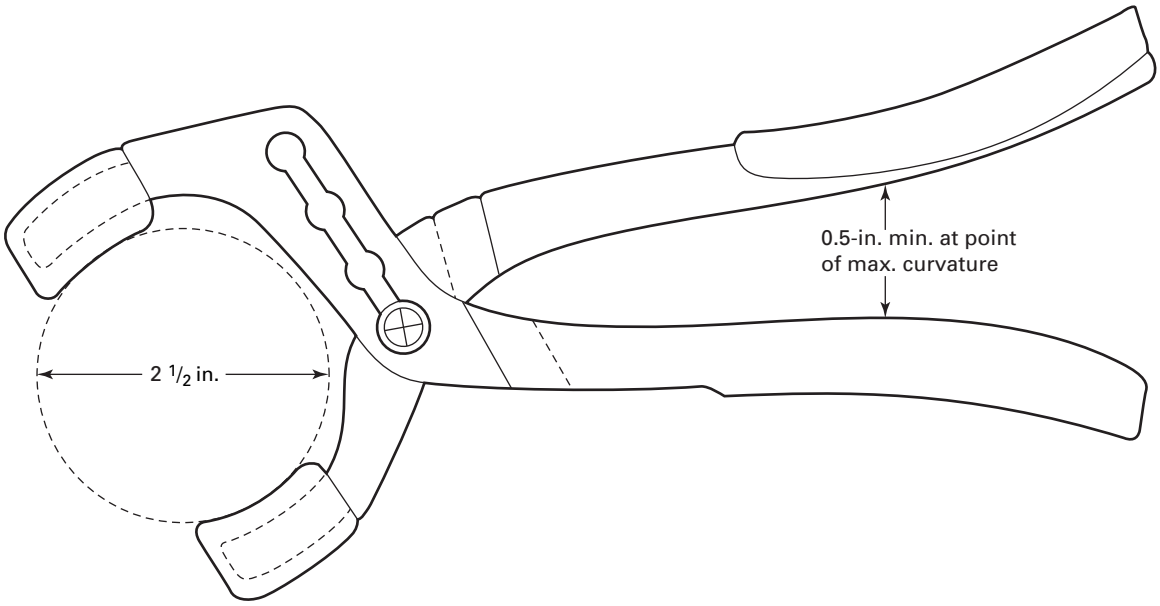
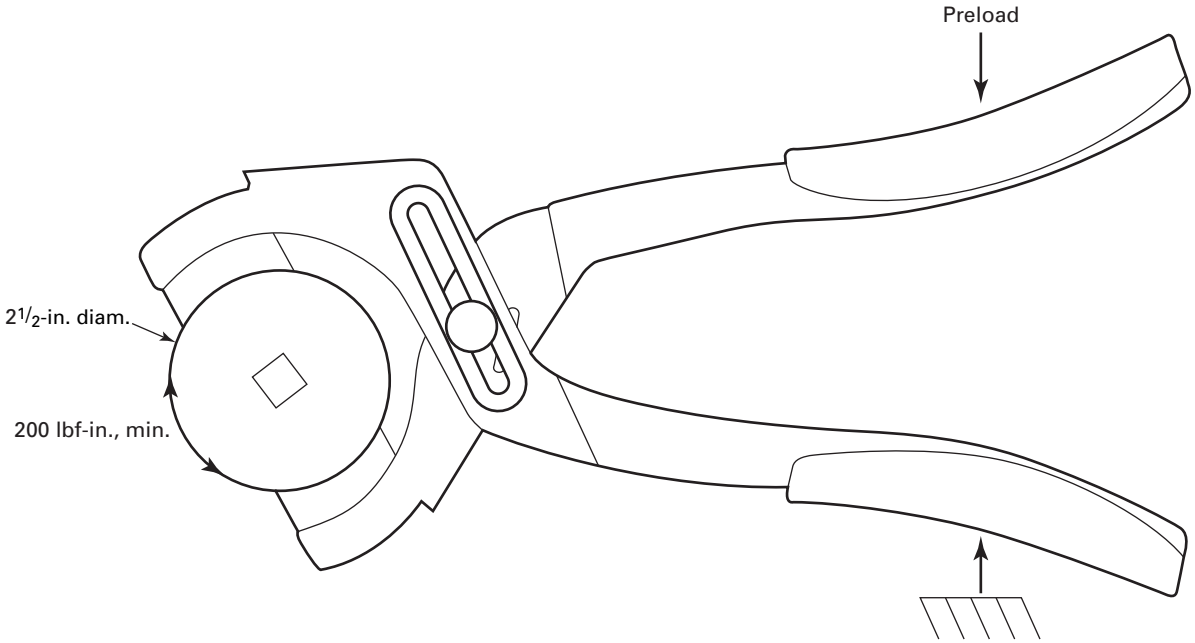


Fig. 2 Pliers, Multiple Position, Maximum Capacity Position



标准分享网 www.bzfxw.com 免费下载

Fig. 3 Jaw Sleeve Insert Test



ASME B107.37

标准分享网 www.bzfxw.com 免费下载

PLIERS: WIRE CUTTERS/STRIPPERS

1 SCOPE

This Standard provides performance and safety requirements for wire strippers, and the cutting and stripping functions of multipurpose tools, for use on solid and stranded copper wire. Inclusion of dimensional data in this Standard does not mean that all pliers described herein are stock production sizes. Consumers should 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 DEFINITIONS

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

3 REFERENCES

The following documents are referenced in this Standard. The latest edition shall be used.

ASME B46.1, Surface Texture (Surface Roughness, Waviness, and Lay)

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900 (www.asme.org)

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

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

MIL-W-16878, Wire, Electrical Insulated, High Temperature

Publisher: Department of Defense, Standardization Documents Order Desk, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094 (www.dsp.dla.mil)

4 CLASSIFICATIONS

Type I: wire strippers, pivoting handles

Class 1: for general-purpose insulation

Class 2: for polytetrafluoroethylene (Teflon®) insulation, MIL-W-16878 Types E and EE[1]

Type II: wire cutters/strippers, flat jaws and handles

Class 1: small frame, strippers forward of pivot, nonadjustable, with spring and lock optional

Class 2: large frame, strippers forward of pivot

Class 3: large frame, strippers rear of pivot

Class 4: small frame, strippers forward of pivot, adjustable size, with spring and lock optional

5 PERFORMANCE REQUIREMENTS

Illustrations shown herein are descriptive, not restrictive, and are not intended to preclude the manufacture of strippers otherwise in accordance with this Standard. Dimensions are without comfort grips.

5.1 Materials

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

5.2 Design

Pliers shall be similar to the figure to which reference is made; shall be proportioned in all parts so as to be strong, durable, and easy to operate; and shall conform to the requirements specified herein. Strippers shall remove insulation in a neat and uniform manner without damaging the conductor, with a maximum of 35 lbf applied at the point of maximum handle curvature, or at the intended load point if there is no curvature. Pliers shall withstand applicable test procedures without cracking or breaking.

5.2.1 Type I, Wire Strippers, Pivoting Handles.

Type I pliers shall strip the insulation from the wire on the compression stroke, leaving the wire either fully or partially stripped and free from damage of any sort.

(a) Class 1, for general-purpose insulation, shall be capable of removing a minimum of 0.75 in. of insulation from general-purpose solid and stranded copper wire. Strippers shall consist essentially of a body, handles, stripping blades, serrated gripping jaws, and automatic stop return and be similar to Fig. 1. Pliers shall be

[1] Teflon is a registered trademark of E. I. du Pont de Nemours and Co.

equipped with blades conforming to one of the sizes specified in Table 1.

(1) The stripping blades shall have a sufficient number of adequately spaced grooves to accommodate the range of wire sizes specified in Table 1 without the necessity of making adjustments in any way.

(2) Pliers shall be provided with a device to stop return of the arms until after the stripped wire is removed. The stripper shall release the wire from the gripping jaws on partial release of compression and simultaneously hold the stripping jaws open to prevent crushing of the wire. Stripping and gripping jaws shall automatically return to the original stripping position as release of the compression is completed. Action shall be such that fine and stranded wires shall not be bent or mushroomed.

(b) Class 2 shall be designed for removal of polytetrafluoroethylene (Teflon®) insulation, MIL-W-16878 Types E (200°C, 600 V) and EE (200°C; 1,000 V), which requires an unusual amount of precision and rigidity in the stripping operation. Pliers shall consist essentially of a body, handles, stripping blades, gripping jaws, an automatic stop return, an optional short latch, and a stripping length stop and be similar to Fig. 2. Pliers shall be equipped with blades conforming to one of the sizes specified in Table 2.

(1) Stripping blades shall have a sufficient number of adequately spaced grooves to accommodate the range of wire sizes specified in Table 2 without the necessity of making adjustments in any way. The blades shall be installed in matched pairs (upper and lower). Support and guidance shall be provided to ensure proper blade alignment when the upper and lower blades are closed on the wire. The stripping blades shall be designed to both cut and accurately position the insulation immediately surrounding the particular place on the wire that is being stripped. The applicable size of blades shown in Table 2 shall also be permanently and legibly marked in a plainly visible place on the blades for each stripper.

(2) The stationary gripping jaw shall lie in a plane approximately parallel to the centers of the stripping holes so that the wire to be stripped will be properly aligned with the applicable groove.

(3) The automatic stop return shall be in accordance with para. 5.2.1(a)(2).

(4) Strippers may be provided with a short stop latch, which shall be easily engaged or disengaged at the option of the user. When engaged, this short stop latch shall limit the strippers' length of stroke to approximately 0.25 in., so that the portion of the insulation on a wire usually stripped off may be severed but only partially removed. This separated piece of insulation may be left to temporarily protect the stripped end of the wire from damage and may be removed by the operator's fingers when it is no longer needed. This short stop latch shall also incorporate a device that shall function within the limited stroke imposed by the short stop latch and shall be similar to, but independent of, the automatic stop return described in para. 5.2.1(a)(2). When the short stop latch is disengaged, it shall in no way interfere with, or hinder, the operation of the wire stripper.

(5) A stripping length stop may be provided so that the ends of the wires may be repeatedly stripped to a predetermined length. This stop shall be adjustable so that any desired stripping length from 0.25 in. to 1.0 in. may be selected and easily set. This stop shall be constructed or designed so that no position in its range will obstruct the operator's view of the grooves and markings on the stripping blades as they close on the wire.

5.2.2 Type II, Wire Cutters/Strippers, Flat Jaws and Handles, Classes 1, 2, 3, and 4. Type II pliers shall be fabricated by joining two halves using flat, one-piece, jaw/handle construction. The joint shall serve as a pivot point, holding both halves of the strippers together. These strippers shall strip general-purpose solid and/or stranded copper wire. The wire to be stripped shall be placed in the applicable groove size, the pliers closed against a positive stop (Class 4 excluded), and the insulation slug pulled off the conductor. Type II strippers shall consist essentially of jaws and handles with comfort grips and be similar to Figs. 3 through 6.

Classes 1, 2, and 3 stripping edges shall provide various sizes of grooves suitable for stripping the type and range of wire sizes specified in Table 3. A groove size shall be provided for applicable wire gage sizes. Each groove shall be accurate for the size marked. Pliers shall also provide a straight, smooth cutting or shearing surface that shall be at least 0.30 in. long. A hole approximately 0.13 in. in diameter and suitably located for loop bending of stripped conductors may be provided.

Class 4 stripping edges are forward of the pivot and shall have an adjustable groove suitable for stripping the type and range of wire sizes specified in Table 3. Pliers shall also provide a straight, smooth cutting or shearing surface that shall be at least 0.30 in. long. A hole approximately 0.13 in. in diameter and suitably located for loop bending of stripped conductors may be provided.

5.3 Handles

5.3.1 Characteristics. Handles shall be shaped to provide a comfortable grip and shall be free from rough edges and sharp corners. Outer hand-gripping surfaces shall be smooth, knurled, impressed, or furnished with comfort grips.

5.3.2 Strength. There shall be no evidence of cracks or breakage during the load test specified in para. 6.3.

5.3.3 Comfort Grips. When comfort grips are furnished on handles, they shall be made of rubber, plastic, or other suitable material capable of withstanding normal use without deteriorating or rubbing off and shall

标准分享网 www.bzfxw.com 免费下载

pass the solvent resistance test specified in para. 6.4. Comfort grips shall remain permanently attached under normal use. Unless specifically designed, labeled, and tested for such use, tools with comfort grips shall not be advertised or marked as having any nonconductive or electrically insulating properties.

5.4 Joint

5.4.1 Construction. There shall be no excessive sideways movement, play, or other indication of looseness that will affect pliers' function when they are opened or closed. Pliers shall pass the joint integrity test specified in para. 6.5.

5.4.2 Fastener Hardness. The fastener hardness shall be from 25 HRC to 55 HRC, except that when the fastener receives a case-hardening treatment, a maximum hardness equivalent to 60 HRC shall be permitted.

5.5 Jaws/Blades

5.5.1 Jaw Opening. Jaws shall open in a smooth and uniform manner to allow insertion of maximum rated unstripped wire size.

5.5.2 Characteristics. There shall be no excessive movement, play, or other indication of looseness of jaws that will affect pliers' function when they are in use.

5.5.3 Gripping Jaws. Type I, Classes 1 and 2 jaws shall have continuous and uniform projections and shall be designed to firmly grip but not damage the wire insulation.

5.5.4 Hardness. Stripping and cutting surface hardness shall be 50 HRC to 59 HRC. Hardness determination shall be taken within 0.125 in. of stripping/cutting edges.

5.5.5 Cut Test. Cutting blades shall pass the cutting test in para. 6.1.

5.6 Spring

When a spring is furnished, it shall be captive, durable, and capable of opening the jaws under normal use. The spring shall open the jaws to allow insertion of maximum rated unstripped wire size.

5.7 Finish

5.7.1 Appearance. All surfaces shall be free from pits, burrs, cracks, and other conditions that may adversely affect appearance or performance. Ground surfaces shall have a maximum surface roughness of 150 μin. Ra (arithmetic average), with a cutoff length of 0.03 in. Surfaces shall be tested in accordance with ASME B46.1.

5.7.2 Coating. All steel surfaces shall be coated to prevent rust. Coating shall be adherent, smooth, continuous, and free from pits, blisters, nodules, and any other conditions that would interfere with their protective value and serviceability.

5.8 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 manufacturer and country of origin shall be readily determined. Gage size of the applicable wires shall be permanently and legibly marked and plainly visible on the face of the blade or jaw, just above or adjacent to the applicable stripping area (except for Type II, Class 4 strippers).

6 TESTS

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

6.1 Cut Test

6.1.1 Wire Cut Test. All pliers with cutters shall cut cleanly through both the insulation and wire of all sizes specified in the applicable tables. The cut test shall be performed three times without damage to the cutting edge.

6.1.2 Stripping Test. All pliers shall be tested by stripping wire sizes specified in the applicable tables. After stripping, the copper wire shall not be nicked, cut, bent, or mushroomed. Upon completion of the test, there shall be no evidence of nicking, chipping, or dulling of the blade; loosening of handles; failure of rollers to rotate freely; scoring or loosening of pins and rivets; or any permanent deformation resulting from the test.

(a) Type I pliers shall be tested by stripping appropriate wire according to blade size, as specified in Table 1 or Table 2. This stripping test shall be conducted by stripping a minimum of 0.75 in. of insulation from three ends of wires for each size groove within the capacity of the stripper being tested. If a short stop latch is supplied, this test shall be conducted with the short stop latch disengaged and then repeated with the short stop latch engaged.

(b) Type II pliers shall be tested by stripping wire specified in Table 3. This stripping test shall be conducted by stripping a minimum of 0.75 in. of insulation from three ends of wires for each size groove within the capacity of the stripper being tested. The insulation shall be removed with a maximum pull-off force of 20 lb while the handles are clamped, without rotary motion of the tool or wire.

6.2 Hardness Test

Hardness shall be tested in accordance with ASME B107.25, para. 4.3.

6.3 Handle Load Test

Pliers shall be tested, using Table 4, in accordance with ASME B107.25, para. 4.1. If the permanent set exceeds the amount specified, the pliers shall be considered to have failed the test. On those tools where the handles or handle stops touch during the handle load test, hardened steel jaw inserts shall be used to prevent the handles or handle stops from touching during the test.

6.4 Solvent Resistance Test for Comfort Grips

Comfort grips shall be tested in accordance with ASME B107.25, para. 4.5.

6.5 Joint Integrity Test

Pliers shall be tested in accordance with ASME B107.25, para. 4.4.1, using a minimum of 1.50 lbf. Maximum allowable play shall be 0.01 in. per inch of handle length measured from the pivot to the end of the handle.

7 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

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

标准分享网 www.bzfxw.com 免费下载

Fig. 1 Type I, Class 1, Wire Cutter/Stripper, Pivoting Handle

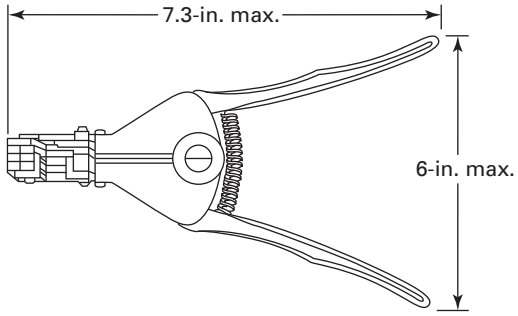


Fig. 2 Type I, Class 2, Wire Stripper for Teflon® Insulation, MIL-W-16878 Types E and EE

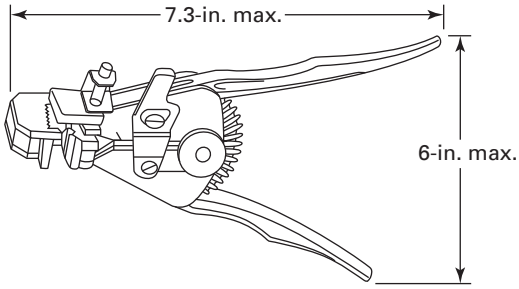


Fig. 3 Type II, Class 1, Wire Cutter/Stripper, Small Frame, Strippers Forward of Pivot, Nonadjustable, With Spring and Lock Optional

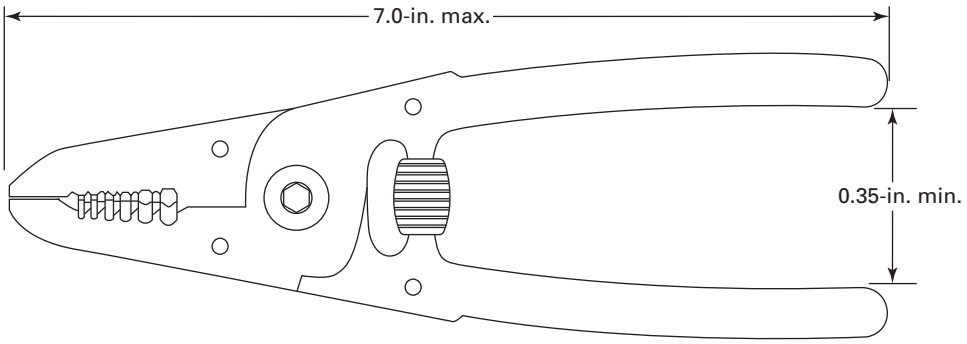


Fig. 4 Type II, Class 2, Wire Cutter/Stripper, Large Frame, Strippers Forward of Pivot

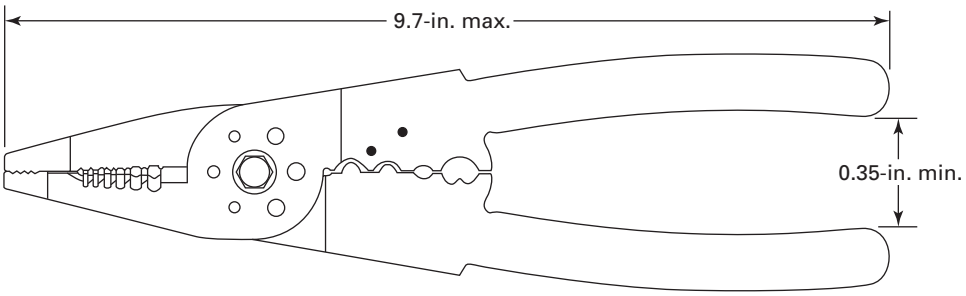


Fig. 5 Type II, Class 3, Wire Cutter/Stripper, Large Frame, Strippers Rear of Pivot

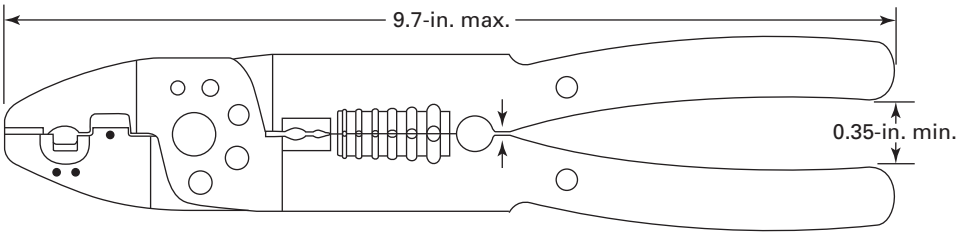
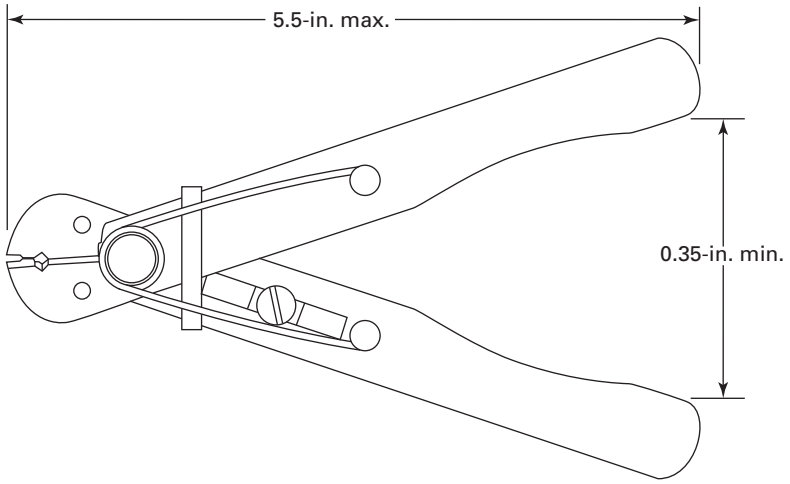


Fig. 6 Type II, Class 4, Wire Cutter/Stripper, Small Frame, Strippers Forward of Pivot, Adjustable Size, With Spring and Lock Optional



标准分享网 www.bzfxw.com 免费下载

Table 1 Type I, Class 1, Blade Sizes and Capacity

Blade Size	Wire Sizes (AWG)	Wire Type
1	8,10	Solid and stranded
4	8	Solid
4	10, 12, 14, 16, 18, 20, 22	Solid and stranded
5	14, 16, 18, 20, 22, 24, 26, 28, 30	Solid and stranded

Table 2 Type I, Class 2, Blade Sizes and Capacity

Blade Size, 600-V Insulation	Blade Size, 1,000-V Insulation	Wire Sizes (AWG)	Wire Type
1E	1EE	10, 12, 14	Stranded
2E	2EE	16, 18, 20, 22, 24, 26	Stranded
3E	3EE	26, 28, 30	Stranded

Table 3 Type II, Blade Sizes and Capacity

Class	Wire Sizes (AWG)	Wire Type
1	8, 10, 12, 14, 16	Solid and stranded
1	16, 18, 20, 22, 24, 26	Solid and stranded
1	22, 24, 26, 28, 30	Solid and stranded
1, 2	10, 12, 14, 16, 18, 20	Solid and stranded
2, 3	10, 12, 14, 16, 18, 20/22	Solid and stranded
3	10, 12, 14, 16, 18	Solid and stranded
3	12, 14, 16	Solid and stranded
4	12 through 26 (adjustable)	Solid

Table 4 Handle Load Test

Type	Class	Load, lbf	Maximum Permanent Set, in.
I	1, 2	50	0.06
II	1	91	0.06
II	2	63	0.06
II	3	48	0.06
II	4	45	0.06

B107 AMERICAN NATIONAL STANDARDS FOR HAND TOOLS

The ASME Publications Catalog shows a complete list of all the Standards published by the Society. For a complimentary catalog, or the latest information about our publications, call 1-800-THE-ASME (1-800-843-2763).

标准分享网 www.bzfxw.com 免费下载

INTENTIONALLY LEFT BLANK

ASME B107.500-2010

ISBN 978-0-7918-3325-4

9 780791 833254

N19010

标准分享网 www.bzfxw.com 免费下载