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Mechanical Engineers

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A N A M E R I C A N N A T I O N A L S T A N D A R D

ADJUSTABLE WRENCHES

	
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FOREWORD

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

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

This Standard is a revision of B107.8M-1996. Principal changes in the revision are the addition of safety requirements and the removal of metric information. The Standard has been reorganized to correlate with the other B107 series standards.

This revision was approved by the American National Standards Institute on May 6, 2003.

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

Suggestions for the improvement of this Standard are welcome. They should be addressed to: The American Society of Mechanical Engineers, Secretary, B107 Standards Committee, Three Park Avenue, New York, NY 10016-5990.

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

ASME B107 COMMITTEE

Hand Tools and Accessories

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

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General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

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

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

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

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

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

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

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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.

ADJUSTABLE WRENCHES

1 SCOPE

This Standard provides performance and safety requirements for open-end adjustable wrenches, with rack and worm adjustment, generally used on both hexagonal and square bolts and nuts. Inclusion of dimensional data in this Standard is not intended to imply that all products described herein are stock production sizes. Consumers are requested to consult with manufacturers concerning lists of production sizes.

2 CLASSIFICATIONS

Adjustable wrenches shall be of the following types:

Type I: standard openings

Type II: wide openings

3 NORMATIVE REFERENCES

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

ASTM B 117-1997, Standard Practice for Operating Salt Spray (Fog) Apparatus

ASTM B 571-1997, Standard Practice for Qualitative Adhesion Testing of Metallic Coatings

ASTM B 537-1997, Standard Practice for Rating of Electroplated Panels Subjected to Atmospheric Exposure

ASTM D 968-1993, Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive

ASTM E 18-2000, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

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

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

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

4 DEFINITIONS

See Fig. 1 as applicable.

adjustable jaw: movable portion of the wrench that contacts the fastener.

adjusting worm: portion of the wrench used to adjust the clearance between the fixed and adjustable jaw.

fixed jaw: portion of the frame that contacts the fastener.

frame: portion of the wrench containing the fixed jaw and handle.

handle: portion of the wrench by which the tool is held.

proof torque: predetermined test torque to which a sample is subjected.

worm pin: pin used to retain the adjusting worm in the frame.

worm spring: spring used to induce friction between the frame and adjusting worm for holding the adjusting worm in any preset position.

5 REQUIREMENTS

The figures in this Standard are descriptive and not restrictive, and are not intended to preclude the manufacture of wrenches that are otherwise in accordance with this Standard.

5.1 Materials

The materials used in the manufacture of the wrenches shall be such as to produce tools conforming to this Standard. The frame, adjustable jaw, adjusting worm, and worm pin shall be steel.

5.2 Marking

Wrenches shall be marked in a legible 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.

5.3 Hardness

The frame (fixed jaw and handle) and adjustable jaw shall show a hardness of not less than 40 HRC nor more than 50 HRC when tested as specified in para. 6.1.

5.4 Proof Torque

Wrenches shall withstand the proof torque specified herein for the appropriate size without failure or permanent deformation (set) that might affect the durability

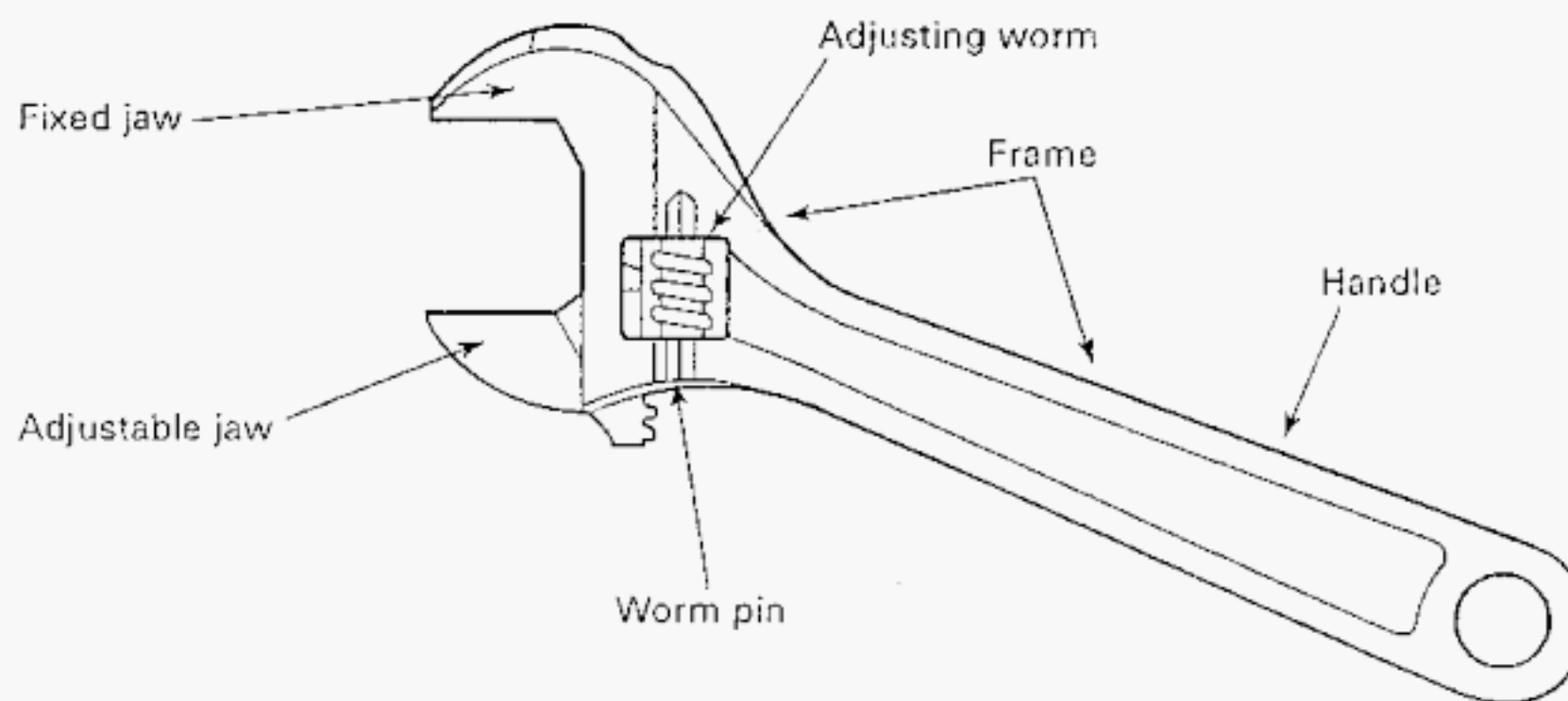


Fig. 1 Definitions

or serviceability of the wrench. There shall be no formation of cracks or fracture of any part of the wrench, including jaw, frame, worm, and worm pin. After proof torque tests, there shall be no resultant binding or loosening of the adjustable jaw. Before and after the proof torque test, each wrench shall be opened and closed to verify the wrench operates over the full range of the jaw opening.

5.5. Finish

5.5.1 Surface Finish. Wrenches shall be free from rust, fins, burrs, pits, nodules, and other conditions that may impair their serviceability, durability, safety, or appearance. The external forge flash shall be removed to blend smoothly with adjacent surfaces.

5.5.2 Coatings. The frame and the adjustable jaw shall have one or more of the coatings described below, with the exception of zinc. Worm and worm pin shall have any of the following coatings:

(a) *Nickel-Chromium Plate.* On wrenches with decorative nickel-chromium plating, the minimum thickness shall be 0.00015 in. for nickel and 0.000003 in. for chrome, unless the wrench passes the test in para. 6.5. Nickel iron undercoating (16% iron max.) may be substituted for nickel.

(b) *Phosphate.* Wrenches having a chemically produced phosphate coating also shall have a coating of rust preventive.

(c) *Oxide.* Wrenches having a coating consisting of a chemically produced oxide also shall have a coating of rust preventive.

(d) *Zinc.* Adjusting worms and worm pins may have a coating of electrodeposited zinc of 0.0003 in. minimum thickness.

(e) *Alternate Coatings.* Alternate coatings may be used in lieu of nickel-chromium and shall be subjected to the Alternate Coating Test, as specified in para. 6.5.

5.6. Design

Wrenches shall consist essentially of a frame (fixed jaw and handle), an adjustable jaw, an adjusting worm, a worm pin, and a worm spring. The angle of the opening of the jaw shall be in accordance with Fig. 2. When the wrench is in the full open position, the jaw shall extend to provide full contact across the flat hexagonal bar of a size that fits the full jaw opening specified for Type I wrenches. The wrench shall be designed to allow free movement of the working parts. The wrench may be provided with or without a movable, jaw-locking device.

5.6.1 Frame (Fixed Jaw and Handle). Means shall be provided in the wrench end of the frame for accepting the assembly of the adjustable jaw, adjusting worm, and worm pin. The handgrip end of the handle shall be provided with a hole.

5.6.2 Adjustable Jaw. The adjustable jaw shall be designed to receive the adjusting worm and formed to permit free travel throughout the range of opening.

5.6.3 Adjusting Worm. The adjusting worm shall be shaped cylindrically and knurled or serrated to facilitate movement of the movable jaw. The adjusting worm shall be held in place by, and shall rotate on, a worm pin.

5.6.4 Worm Pin. The worm pin shall support the adjusting worm in place at both ends.

5.6.5 Worm Spring. A worm spring shall be provided to induce friction between the frame and adjusting worm for holding the adjusting worm in any preset position.

5.6.6 Clearance of Adjustable Jaw. Clearance between the slide rail of the adjustable jaw and the slide rail of the fixed jaw at any opening within the specified capacity shall not exceed the values shown in Table 1.

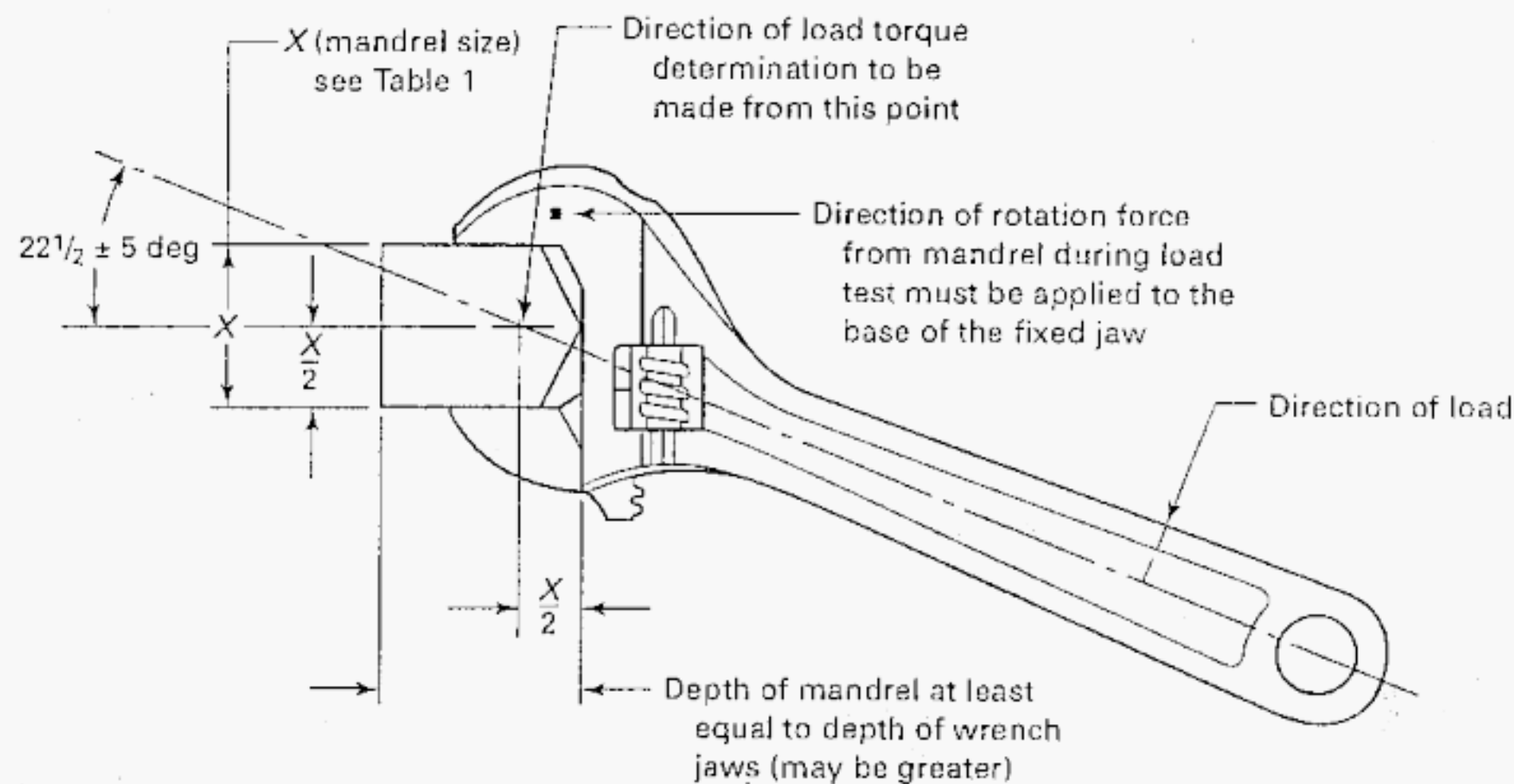


Fig. 2 Test Configuration

Table 1 Wrench Properties

Nominal Size, in.	Overall Length		Jaw Depth, Min. Types 1 and 2, in.	Full Opening of Jaw Not Less Than		Thickness			Clearance of Adjustable Jaw (See Fig. 3), Max., in.	Parallelism of Adjustable Jaw (See Fig. 5 Dimension Y), Max., in.	Proof Torque, Min., lbf-in.	Mandrel Sizes, X, Across Flats +0.000/-0.005
	Min., in.	Max., in.		Type 1, in.	Type 2, in.	Jaw Tip, Max., in.	Head, Max., in.	Handle, Max., in.				
4	3.5	4.5	0.43	0.504	...	0.250	0.375	0.350	0.012	0.007	600	0.500
6	5.5	6.5	0.65	0.756	0.938	0.281	0.455	0.420	0.012	0.008	1,450	0.750
8	7.5	8.5	0.81	0.947	1.125	0.343	0.575	0.470	0.015	0.008	2,700	0.938
10	9.5	10.5	0.98	1.133	1.290	0.437	0.665	0.570	0.015	0.009	4,500	1.125
12	11.5	12.5	1.14	1.321	1.500	0.531	0.805	0.600	0.015	0.010	7,650	1.312
15	14.5	15.5	1.46	1.698	...	0.625	1.000	0.688	0.015	0.012	15,000	1.688
16	15.7	16.7	1.62	1.875	...	0.656	1.031	0.688	0.015	0.012	15,000	1.875
18	17.5	19.0	1.78	2.062	...	0.718	1.218	0.750	0.015	0.015	20,000	2.062
20	19.5	21.0	2.06	2.375	...	0.781	1.312	0.750	0.015	0.015	20,000	2.375
24	23.5	25.0	2.11	2.438	...	0.906	1.438	0.875	0.018	0.018	25,000	2.438

5.6.7 Parallelism of Jaw Surfaces. When tested as specified in para. 6.4, jaws shall be parallel within the limits of clearance for the size specified in Table 1.

6 TEST PROCEDURES

Many of the tests herein are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting these tests.

6.1 Hardness

Hardness shall be tested in accordance with ASTM E 18. When surface preparation is necessary, the amount of material removed shall not exceed 0.007 in. in the area contacted by the indenter.

6.2 Clearance of Adjustable Jaw

The clearance of the adjustable jaw shall be measured before proof torque test throughout its operating range to determine compliance with para. 5.6.6. With the adjustable jaw pressed firmly by hand to one side, a feeler gage of the applicable size specified in Table 1 shall not enter the space between one side of the adjustable jaw base and the opposite bearing surface of the fixed jaw (see Fig. 3). The test shall then be repeated with the jaw pressed to the opposite side.

6.3 Proof Torque Test

6.3.1 Mandrels for Wrench Openings. Wrenches shall be tested on a mandrel conforming to Table 1 and Fig. 4 for the size of wrench indicated.

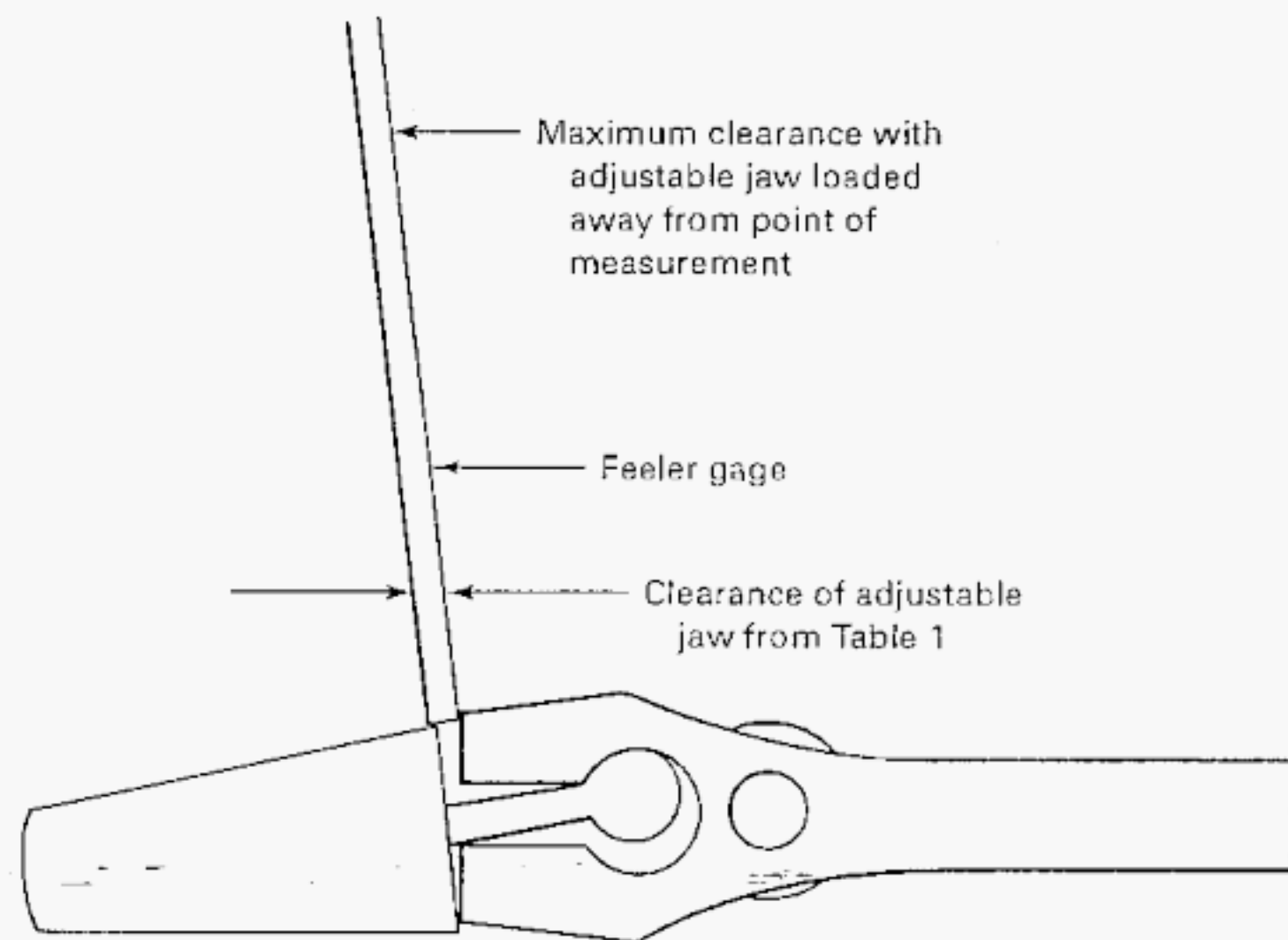
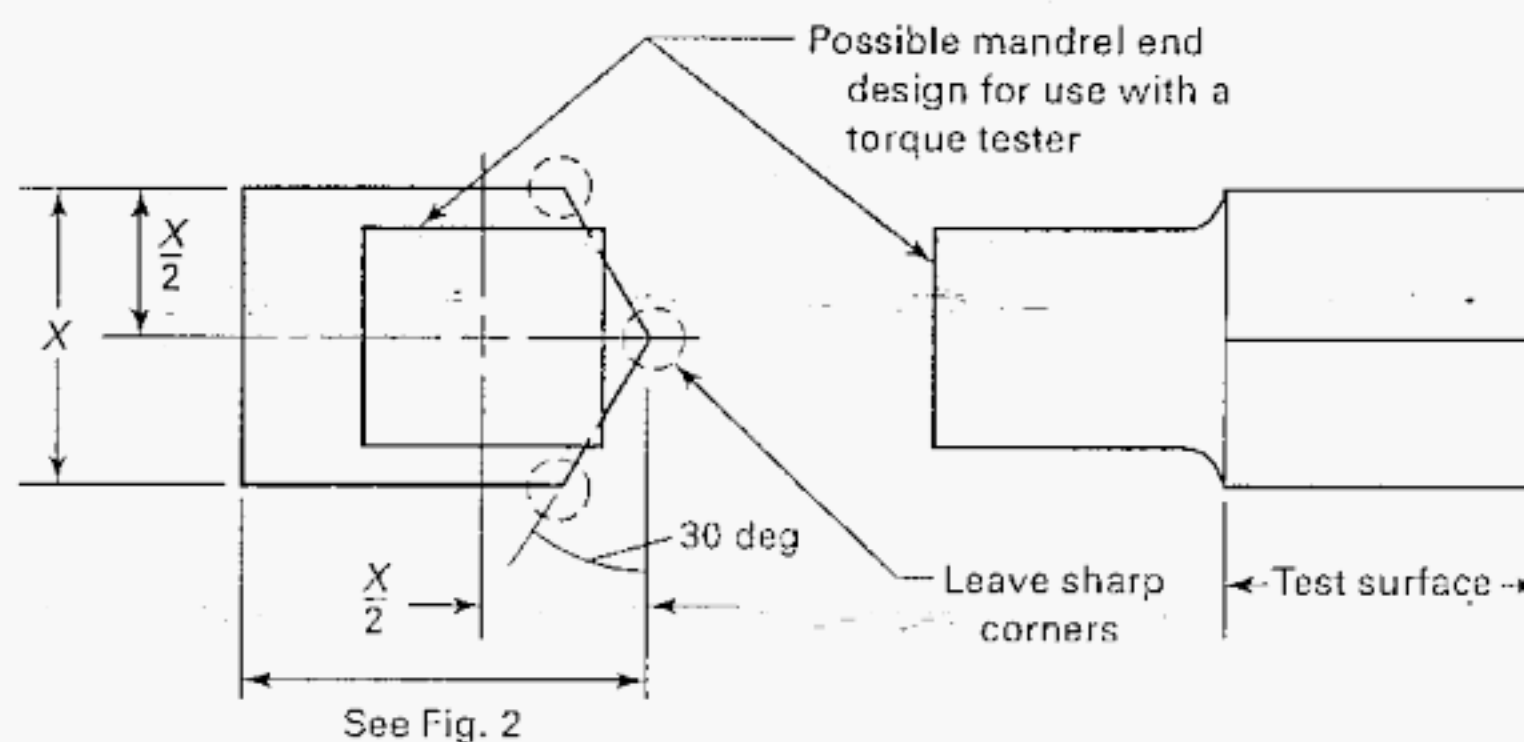


Fig. 3 Jaw Clearance Measurement



GENERAL NOTE: Mandrels shall be hardened to not less than 55 HRC per para. 6.2.1.

Fig. 4 Mandrel Configuration

6.3.2 Wrench Preparation. To prepare the wrench for test, suitable reference lines may be scribed on the frame. After application of proof torque, examination for permanent deformation shall be made.

6.3.3 Application of Proof Torque. The torque shall be applied with a suitable torque-producing machine. The torque shall be applied and then removed. The direction of loading shall be as shown in Fig. 2. It is important that the jaws are tight on the mandrel; otherwise, secondary stress will be introduced by the mandrel.

6.4 Parallelism of Jaw Surfaces

The parallelism of opposite jaw faces shall be measured after torque tests to determine compliance with para. 5.6.7.

The parallelism shall be determined by the use of a gage block and step block conforming to the requirements shown in Fig. 5. With the gage block placed between the jaw faces as near to the bottom of the opening as possible (see Fig. 5), insert the step block between the jaw tip and the surface of the gage block. The GO portion of the step block shall enter the space between the jaw tip and the gage block and the NO GO portion of the step block shall not enter the space between the jaw tip and the gage block.

6.5 Alternate Coating Test

The test consists of an adhesion, abrasion, and corrosion test specified in paras. 6.5.2, 6.5.3, and 6.5.4.

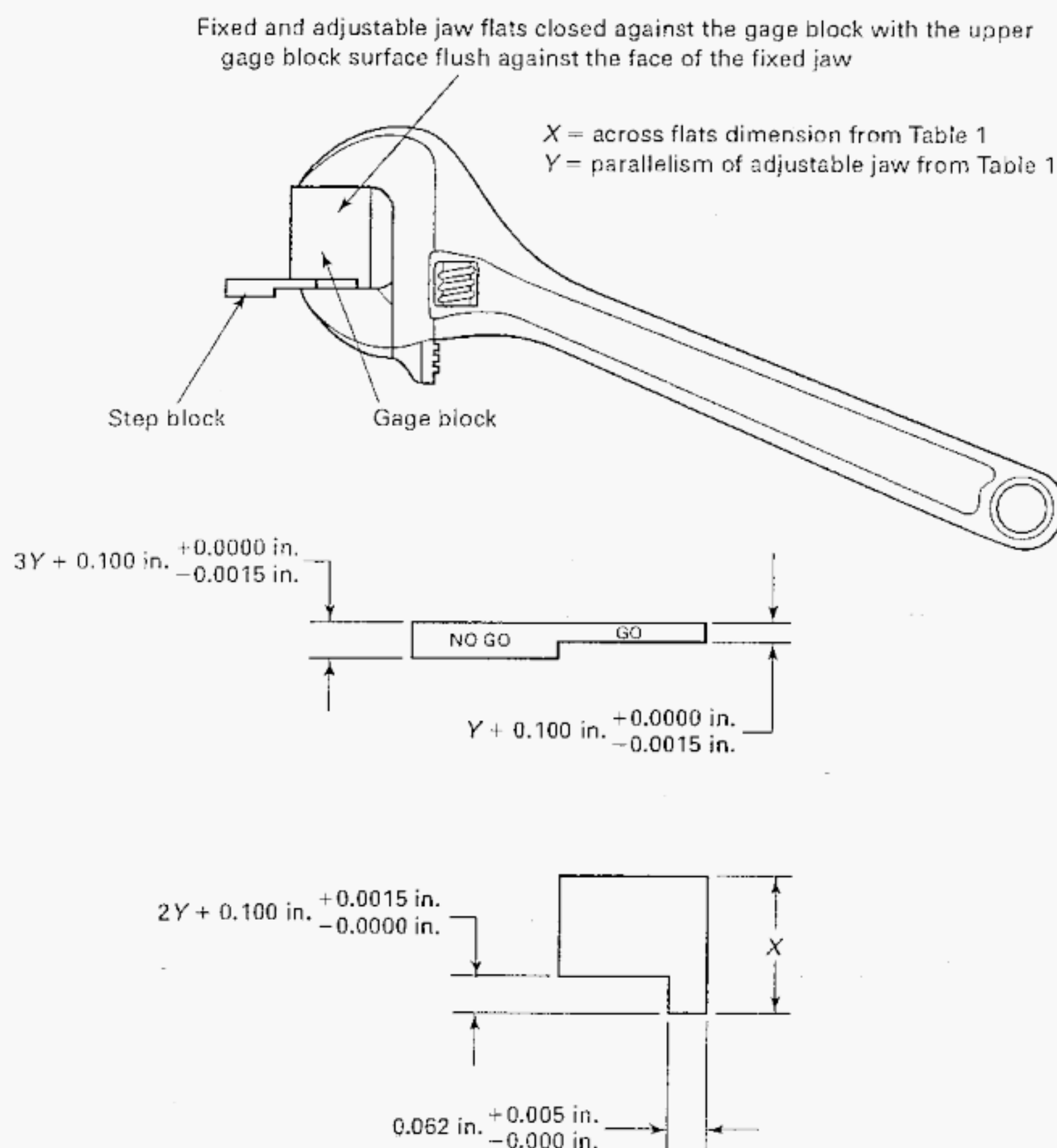


Fig. 5 Parallelism Measurement

6.5.1 Test Preparation. The quantity and condition of the wrenches used for this testing shall be per the manufacturer's standard practice or as mutually agreed upon by the manufacturer and the customer.

6.5.2 Adhesion Test. Sample wrenches shall pass the file or grind-saw test of ASTM B 571.

6.5.3 Abrasion Test. Sample wrenches shall have no base material exposed after being subjected to 100 l of falling sand, per ASTM D 968 Method A.

6.5.4 Corrosion Test. The exterior surfaces of sample wrenches shall be tested for corrosion resistance by exposure to a 48 hr salt spray test, as specified in ASTM B 117, without falling below the ASTM B 537 rating of 6.

7 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

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

8 DESIGNATIONS

Adjustable wrenches shall be designated by the following data in the sequence of type, finish, and size:

EXAMPLE: Adjustable Wrench Type II, wide opening; chrome plate; size 4 in.

AMERICAN NATIONAL STANDARDS FOR HAND TOOLS

Socket Wrenches, Hand (Inch Series)	B107.1-2002
Socket Wrenches, Extensions, Adaptors, and Universal Joints, Power Drive (Impact) (Inch Series).....	B107.2-2002
Driving and Spindle Ends for Portable Hand, Impact, Air, and Electric Tools (Percussion Tools Excluded).....	B107.4M-2002
Socket Wrenches, Hand (Metric Series)	B107.5M-2002
Adjustable Wrenches.....	B107.8-2003
Handles and Attachments for Hand Socket Wrenches — Inch and Metric Series.....	B107.10M-1996
Pliers: Diagonal Cutting and End Cutting.....	B107.11-2002
Nut Drivers (Spin Type, Screwdriver Grip) (Inch Series)	B107.12-1997
Pliers: Long Nose, Long Reach	B107.13-2003
Hand Torque Tools.....	B107.14M-1994
Flat Tip Screwdrivers	B107.15-2002
Shears (Metal Cutting, Hand)	B107.16M-1998
Gages, Wrench Openings, Reference	B107.17M-1997
Pliers: Wire Twister	B107.18-2003
Pliers, Retaining Ring	B107.19-1993(R1998)
Pliers (Lineman's, Iron Worker's, Gas, Glass, Fence, and Battery)	B107.20M-1998
Wrench, Crowfoot Attachments.....	B107.21-1998
Electronic Cutters.....	B107.22M-1998
Pliers, Multiple Position, Adjustable	B107.23M-1997
Locking Pliers.....	B107.24-2002
Pliers: Performance Test Methods	B107.25-2002
Pliers: Multiple Position, Electrical Connector.....	B107.27-2003
Electronic Torque Instruments	B107.28M-1997
Electronic Tester, Hand Torque Tools	B107.29M-1998
Cross Tip Screwdrivers	B107.30-2002
Screwdrivers, Cross Tip Gaging.....	B107.31M-1997
Socket Wrenches, Impact (Metric Series).....	B107.33M-2002
Socket Wrenches for Spark Plugs.....	B107.34-2003
Nut Drivers (Spin Type, Screwdriver Grip) (Metric Series).....	B107.35M-1997
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Pliers: Wire Cutters/Strippers	B107.37-2003
Electronic Pliers	B107.38M-1998
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Metal Punches and Drift Pins: Safety Requirements.....	B107.48M-1998
Nail Sets: Safety Requirements	B107.49M-1998
Brick Chisels and Brick Sets: Safety Requirements.....	B107.50M-1998
Star Drills: Safety Requirements.....	B107.51-2001
Nail-Puller Bars: Safety Requirements	B107.52M-1998
Ball Peen Hammers: Safety Requirements.....	B107.53M-1998
Heavy Striking Tools: Safety Requirements	B107.54-2001
Axes: Safety Requirements	B107.55M-2002
Body Repair Hammers and Dolly Blocks: Safety Requirements.....	B107.56-1999
Bricklayers' Hammers and Prospecting Picks: Safety Requirements	B107.57-2001
Riveting, Scaling, and Tinner's Setting Hammers: Safety Requirements	B107.58M-1998
Slugging and Striking Wrenches.....	B107.59-2002
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