

ASME B107.6-1994

(REVISION OF ANSI B107.6-1978)

**Wrenches, Box, Angled,
Open End, Combination, Flare Nut,
and Tappet (Inch Series)**

AN AMERICAN NATIONAL STANDARD



The American Society of
Mechanical Engineers

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The American Society of
Mechanical Engineers

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FOREWORD

(This Foreword is not part of ASME B107.6-1994.)

The American National Standards Committee B107, Socket Wrenches and Drives, under sponsorship by The American Society of Mechanical Engineers, held its organizational meeting on June 28, 1967. Subcommittees were subsequently organized to handle the expanded need of both inch and metric series American National Standards Institute standards dealing with wrenches, handles and attachments. This Standard is one of a series of such standards.

Members of the Hand Tools Institute have been major contributors to the development of these standards in their committee work, their knowledge of the products, and their active efforts in the promotion of adoption of the standards.

The Standard was submitted to the industry for review and comment. Following the approval by the Standards Committee B107 and the sponsor, it was approved by the American National Standards Institute on August 11, 1978, and designated ANSI B107.6-1978.

The latest edition of this Standard, ASME B107.6-1994, was approved by the American National Standards Institute on October 11, 1994.



ASME STANDARDS COMMITTEE B107

Hand Tools and Accessories

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

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WRENCHES, BOX, ANGLED, OPEN END, COMBINATION, FLARE NUT, AND TAPPET (INCH SERIES)

1 SCOPE

This Standard is intended to cover the complete general and dimensional data for wrenches, including combination, angled, open end, box, flare nut and tappet.

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

2 CLASSIFICATION

Type I Box wrench, double head

Class 1 — 15 deg. offset each end

Style 1 — Regular length

Style 2 — Short length

Class 2 — Deep or modified offset each end

Style 1 — Regular length

Style 2 — Short length

Type II Engineer's wrench, double head, open end, 15 deg.

Style 1 — Regular length

Style 2 — Short length

Type III Combination wrench, open end and 15 deg. offset box opening

Style 1 — Regular length

Style 2 — Short length

Style 3 — Long length

Type IV Flare nut wrench, double head, open end

Type V Flare nut combination wrench, open end and 15 deg. offset box opening

Type VI Angle wrench, double head, open end

Style 1 — 15 deg. and 60 deg. open end

Style 2 — 30 deg. and 60 deg. open end

Style 3 — 15 deg. and 75 deg. open end

Type VII Tappet wrench, double head, open end

Type VIII Tappet wrench, single head, open end

3 NORMATIVE REFERENCES

ASTM E-10-93 Standard Test Method for Brinell Hardness of Metallic Materials

ASTM E-18-94 Rockwell Hardness and Rockwell Superficial Hardness of Materials, Test for ASME B107.17M-1991 Gages, Wrench Openings, Reference

4 REQUIREMENTS

4.1 Illustrations

The illustrations shown herein are descriptive and not restrictive, and are not intended to preclude the manufacture of wrenches which are otherwise in accordance with this Standard.

4.2 Materials

The materials used in the manufacturing of the wrenches shall be such as to produce wrenches conforming to the physical requirements hereinafter described.

4.3 Markings

Each wrench, except for Type III combination, shall be marked on one of the faces or on the handle as close to each head as is practicable in a plain and permanent manner with the respective nominal wrench opening as shown in the first column of the applicable Table. Type III combination wrenches shall be marked on either one end, both ends or handle. In addition to size markings, each wrench shall be marked in a plain and permanent manner with manufacturer's name or trademark of such known character that the source of manufacture and country of origin may be readily determined.



4.4 Hardness

Wrenches shall be heat treated to a hardness not less than 38 HRC nor more than 55 HRC. (Brinell 353-547 HB)

4.5 Proof Loads

When tested as specified, wrenches shall withstand the proof loads specified in the applicable Tables without failure or permanent deformation (set) which might affect the durability or serviceability of the wrenches.

4.6 Wrench Opening

Wrench opening tolerances shall be such as to insure acceptance when gaged with gages conforming to ASME B107.17M.

4.7 Finish

4.7.1 Surface Finish (See Fig. 1). All surfaces shall be thoroughly cleaned, free from cracks, and essentially free from burrs, pits, nodules, and other detrimental deficiencies.

4.7.1.1 Minimum Area of Surface Finish. A minimum of 180 deg. of the outer periphery of the box ends (90 deg. on each side of the longitudinal axis of the wrench) and both faces of the open end shall be bright and shall have a maximum roughness height value of 30 μ in. (arithmetical average).

4.7.1.2 Flash. Flash shall be completely removed from the periphery of the heads of all box wrenches, from the circumference of all open end wrenches, and from that portion of the handle which shall be essentially straight and uniform in sectional dimensions. Any remaining flash on any surface shall blend smoothly with adjacent surfaces; external sharp edges shall be broken to $\frac{1}{64}$ in. radius minimum, and shall not project more than $\frac{1}{64}$ in. from adjacent surfaces.

4.7.2 Coatings. The coating shall be adherent, smooth, continuous, and free from uncoated areas, pits, blisters, nodules, and any other defects which would interfere with their protective value and serviceability. All wrenches shall have one of the following coatings.

4.7.2.1 Chrome Plate. Wrenches shall have a protective-decorative nickel-chromium plating. The nickel thickness shall be a minimum of 0.000150 in.

WRENCHES, BOX, ANGLED, OPEN END, COMBINATION, FLARE NUT, AND TAPPET (INCH SERIES)

The chromium thickness shall be a minimum of 0.000003 in. A nickel-iron undercoating may be substituted for nickel.

4.7.2.2 Phosphate. Wrenches shall have a chemically produced phosphate coating followed by a coating of rust preventative.

4.7.2.3 Oxide. Oxide coated wrenches shall have a coating consisting of a chemically produced oxide followed by a coating of rust preventative.

4.8 Design

Wrenches shall be so designed as to afford a well proportioned, comfortable handgrip, and be similar to the figure to which reference is made. The nut and bolt head-engaging surfaces of the box and open end wrenches shall be finished in a smooth and well-defined manner. The corners and serrations in the box wrench openings shall be clearly defined (not smeared or torn). Wrenches that have a box end design, except Type I Class 2 shall be chamfered on both sides to provide a lead for the working surfaces. The chamfer for Type I Class 2 shall be as shown in Fig. 1. The tips (working ends) of all open end wrenches shall also be chamfered or rounded to eliminate burrs (see Fig. 1).

4.9 Type I, Box Wrench, Double Head

The wrench shall be suitable for use with hexagonal boltheads and nuts. Each box opening shall have either a 6 or 12 point (hexagon or double hexagon) opening as specified.

4.9.1 Class 1, 15 deg. Offset Each End, Style 1 and 2 Regular and Short Length. Shall be similar to Fig. 2A or Fig. 2B. Style 1 shall conform to Table 1 and Style 2 shall conform to Table 2.

4.9.2 Class 2 Double Offset Each End, Deep Offset or Modified Offset

4.9.2.1 Class 2 Deep Offset. Shall be similar to Fig. 3. Style 1 shall conform to Table 3 and Style 2 shall conform to Table 4.

4.9.2.2 Class 2 Modified Offset. Shall be similar to Fig. 4. Style 1 shall conform to Table 5 and Style 2 shall conform to Table 6.



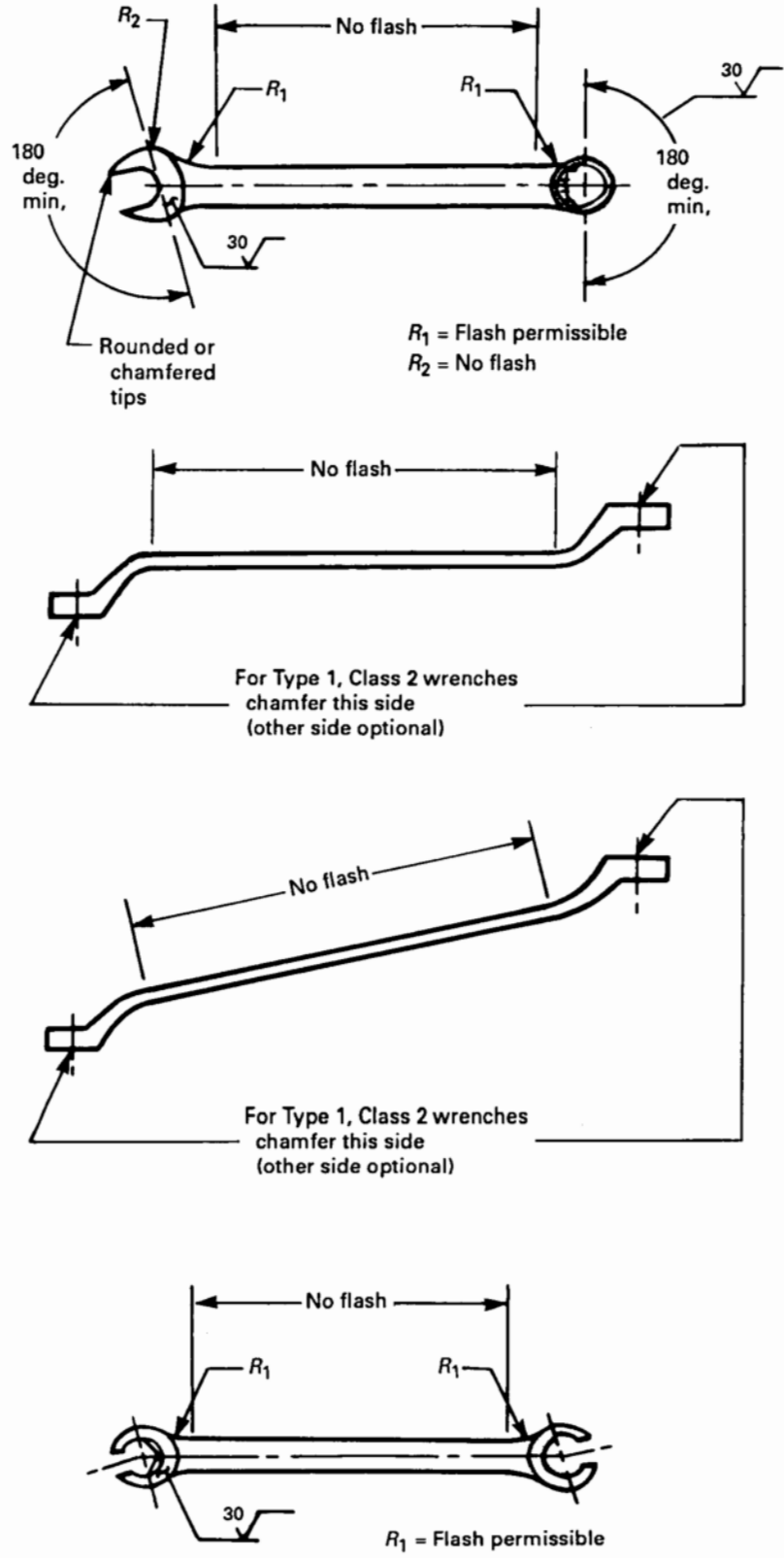


FIG. 1 FINISH REQUIREMENTS



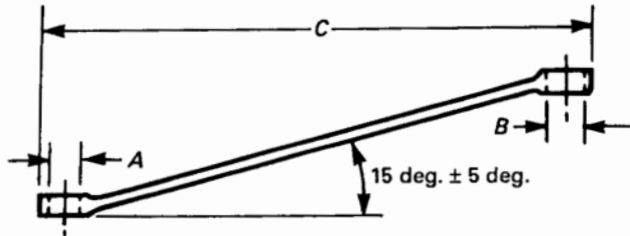


FIG. 2A TYPE I, CLASS 1, STYLE 1 AND 2 BOX WRENCH, DOUBLE HEAD, 15 deg. OFFSET EACH END, REGULAR AND SHORT LENGTHS

WRENCHES, BOX, ANGLED, OPEN END, COMBINATION, FLARE NUT, AND TAPPET (INCH SERIES)

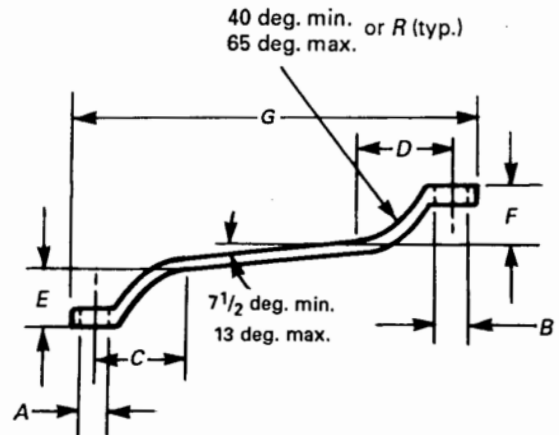


FIG. 4 TYPE I, CLASS 2, STYLE 1 AND 2 BOX WRENCH, MODIFIED OFFSET, REGULAR AND SHORT LENGTHS

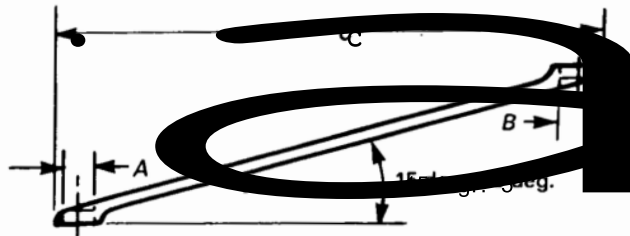


FIG. 2B TYPE I, CLASS 1, STYLE 1 AND 2 BOX WRENCH, DOUBLE HEAD, 15 deg. OFFSET EACH END, REGULAR AND SHORT LENGTHS

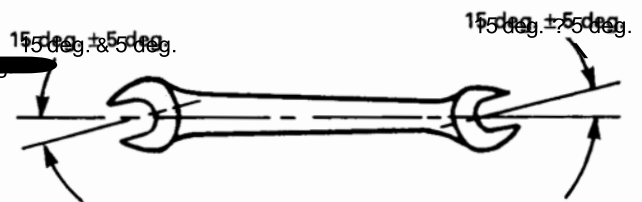


FIG. 5 TYPE III, STYLE 1 AND 2 ENGINEERS WRENCH, DOUBLE HEAD, OPEN END, 15 deg. OFFSET

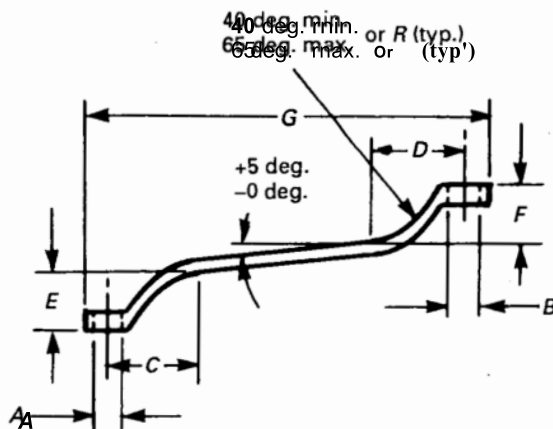


FIG. 3 TYPE I, CLASS 2, STYLE 1 AND 2 BOX WRENCH, DOUBLE END, DEEP OFFSET EACH END, REGULAR AND SHORT LENGTHS

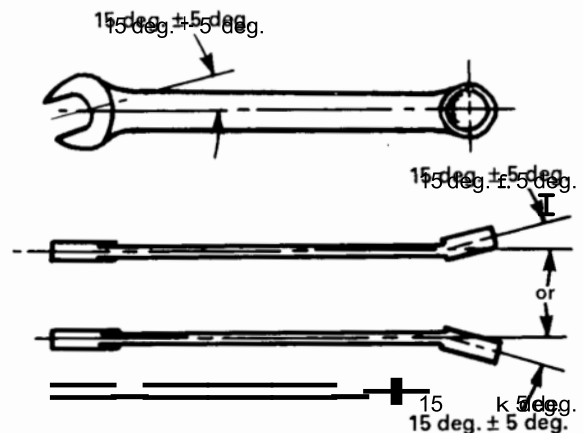
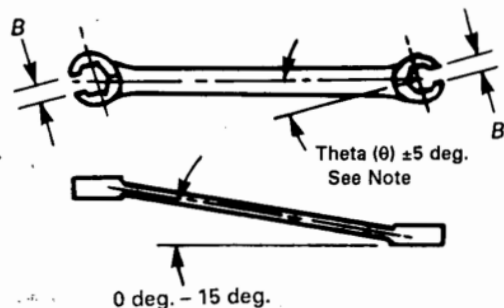


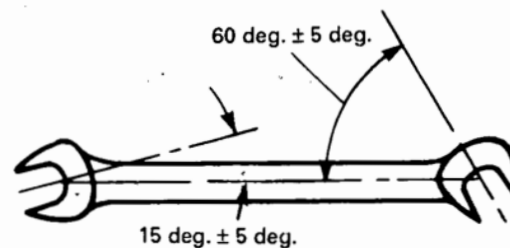
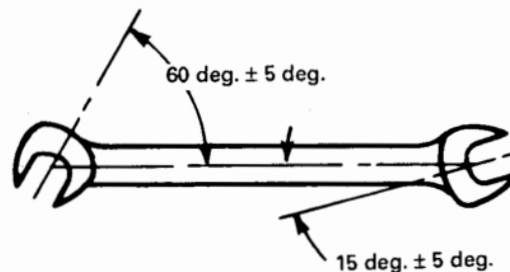
FIG. 6 TYPE III, STYLE 1, 2, AND 3 COMBINATION WRENCH, OPEN END, AND 15 deg. OFFSET BOX OPENING



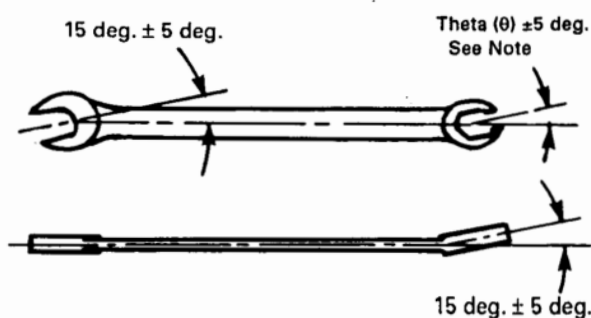


NOTE:
Theta (θ) to be 0 deg. or an
increment of 7 1/2 deg.

**FIG. 7 TYPE IV, FLARE NUT WRENCH,
DOUBLE HEAD**

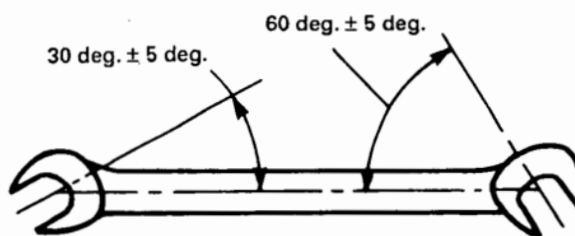
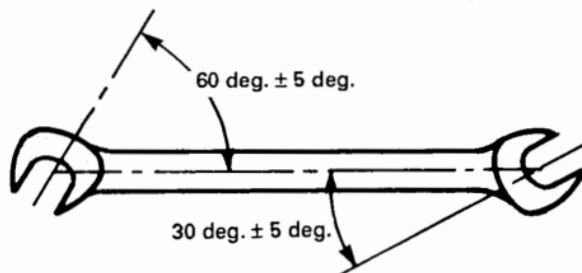


**FIG. 9 TYPE VI, STYLE 1 ANGLE WRENCH,
DOUBLE HEAD, OPEN END, 15 deg. AND
60 deg. HEADS**

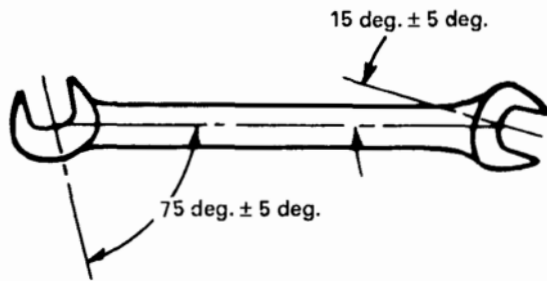


NOTE:
Theta (θ) to be 0 deg. or an
increment of 7 1/2 deg.

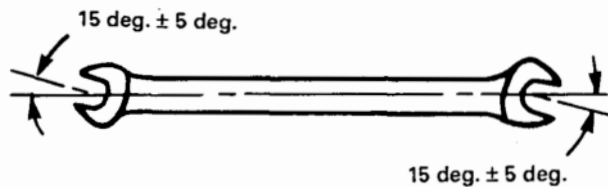
**FIG. 8 TYPE V, FLARE NUT COMBINATION
WRENCH, OPEN END, AND 15 deg. OFFSET
BOX OPENING**



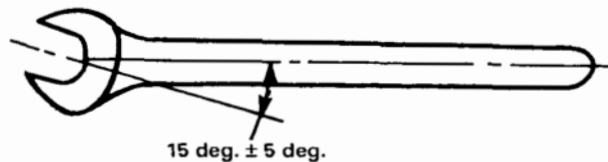
**FIG. 10 TYPE VI, STYLE 2 ANGLE WRENCH,
DOUBLE HEAD, OPEN END, 30 deg. AND
60 deg. HEADS**



**FIG. 11 TYPE VI, STYLE 3 ANGLE WRENCH,
DOUBLE HEAD, OPEN END, 15 deg.
AND 75 deg. HEADS**



**FIG. 12 TYPE VII, CLASS 1, TAPPET WRENCH,
DOUBLE HEAD, OPEN END, 15 deg.**



**FIG. 13 TYPE VIII, CLASS 2, TAPPET
WRENCH,
SINGLE HEAD, OPEN END, 15 deg.**

4.10 Type II, Engineer's Wrench, Double Head, Open End, 15 deg.

The wrench shall be suitable for use on hexagonal and square-headed bolts and nuts, shall conform to Tables 7A and 7B and shall be similar to Fig. 5.

4.11 Type III, Combination Wrench, Open End, and 15 deg. Offset Box Opening

The wrench shall have one open end and one box end of identical nominal size. The open end shall be suitable for use on hexagonal and square-headed bolts and nuts. The box opening shall have either a 6 or 12 point (hexagon or double hexagon) opening as specified. The wrench shall conform to Table 8 and shall be similar to Fig. 6.

4.12 Type IV, Flare Nut Wrench, Double Head

The wrench shall be suitable for use with hexagonal flare nuts. Each opening shall have either a 6 or 12 point (hexagon or double hexagon) box opening as specified and shall be similar to Fig. 7 and conform to Table 9.

4.13 Type V, Flare Nut Combination Wrench, Open End, and 15 deg. Offset Box Opening

The wrench shall have one open end and one end with a 6 or 12 point (hexagon or double hexagon) box opening of identical nominal size. The wrench shall be suitable for use on hexagonal flare nuts. Wrenches shall conform to Table 10 and shall be similar to Fig. 8.

4.14 Type VI, Angle Wrench, Double Head, Open End

The wrench shall have two open ends inclined from the wrench handle. Styles 1, 2 and 3 shall be similar to Figs. 9, 10, and 11, respectively, and conform to Table 11.

4.15 Type VII, Class 1, Tappet Wrench, Double Head, Open End, 15 deg.

The wrench shall have two open ends inclined from the wrench handle. Wrenches shall conform to Table 12 and be similar to Fig. 12.

4.16 Type VIII, Class 2, Tappet Wrench, Single Head, Open End, 15 deg.

The wrench shall have an open end inclined from the wrench handle. Wrenches shall conform to Table 13 and be similar to Fig. 13.

4.17 Workmanship

The requirements within this Standard are intended to describe the best commercial quality wrenches available. The wrenches shall conform to the quality of end product specified by the requirements in this Standard. In addition, the wrenches shall be free from rust, burrs, fins, nodules, or other defects which may impair their serviceability, durability or appearance. Plating contact marks should be kept to a minimum.

5 TEST PROCEDURES

5.1 Hardness

The hardness range specified in para. 4.4 shall be tested using procedures outlined in ASTM E-18 or ASTM E-10. When surface preparation is necessary the amount of material removed shall not exceed 0.007 in. in the area contacted by the indenter.

5.2 Proof Test

Proof test shall be conducted on the sample wrenches to determine conformance with the applicable proof load requirements specified in para. 4.5.

5.2.1 Reference Line for Determining Permanent Deformation. In order to prepare the sample for test, suitable reference lines may be scribed on the heads and handle. After application of proof load, examination for permanent deformation shall be made.

5.2.2 Mandrels For Wrench Openings. Suitable mandrels shall be used to fit into the wrench opening and to provide the proper support and necessary strength for the proof load applied. The wrenches shall be tested on hexagonal mandrels. Mandrels shall conform to the dimensions and tolerances of Table 14. Mandrels shall be hardened to show a hardness of not less than 55 HRC and smoothly finished on the wrench engaging surfaces.

5.2.3 Application of Proof Load. The proof load specified in the applicable Table is the torque applied to the test mandrel which tends to rotate the mandrel about its longitudinal axis. The torque shall be applied to mandrels which are fully seated and extend through the wrenching surfaces. The force required to produce the torque shall be applied as far from the mandrel as practicable. Wrench openings shall be gaged prior

to testing and only those openings which are in accordance with the gage shall be tested.

5.2.3.1 Box Ends and Open Box Ends. Box ends shall be loaded to the proof load. Following the removal of the proof load, they shall be regaged. Any box end which does not sustain the test load, cracks, fractures, slips on mandrel, or does not gage after loading has failed the test. Wrench failure has also occurred if there is visible permanent distortion in the handle and/or permanent deformation of the box head with respect to the handle in excess of 5 deg.

5.2.3.2 Open Ends. Open ends shall be loaded to the proof load. Following the removal of the proof test load they shall be regaged. Open ends which do not sustain the test load, crack, fracture, slip on the mandrel or exhibit visible handle distortion have failed the test. Wrench failure has also occurred if the open end jaws spread in excess of the "NO GO" gage as specified by ASME B107.17M size by more than the following:

0.002 for wrench sizes $\frac{5}{32}$ in. through 1 in.
0.003 for wrench sizes $1\frac{1}{16}$ in. through $2\frac{1}{4}$ in.

6 DESIGNATIONS

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

TYPE
CLASS
STYLE
SIZE OF OPENINGS
CONFIGURATION OF OPENINGS

Example: Box wrench Type I, deep double offset each end Class 2, regular length Style 1, size $\frac{1}{2} \times \frac{9}{16}$ double hex openings.



**TABLE 1 TYPE I, CLASS 1, STYLE 1, BOX WRENCH, DOUBLE HEAD, 15 deg. OFFSET EACH END,
REGULAR LENGTH**

Wrench Opening Across Flats		Outside Diameter of Heads		Permitted Eccentricity of Wrench Openings to Outside Diameter	Thickness of Wrench Heads		Overall Length		Proof Load, Inch-Pounds	
A	B	A	B		A	B			A	B
Small Head	Large Head	Small Head	Large Head		Small Head	Large Head			Small Head	Large Head
		Max.	Max.		Max.	Max.	C		Min.	Min.
7/32	1/4	0.391	0.453	0.015	0.203	0.219	4.500	6.000	165	220
1/4	5/16	0.453	0.563	0.015	0.295	0.295	5.000	7.125	220	275
5/16	3/8	0.563	0.625	0.015	0.330	0.344	6.000	7.750	275	605
3/8	7/16	0.625	0.730	0.015	0.328	0.360	6.500	8.531	605	715
7/16	1/2	0.730	0.822	0.015	0.360	0.391	7.500	8.750	715	1020
1/2	9/16	0.822	0.906	0.015	0.391	0.420	7.500	9.188	1020	1500
9/16	5/8	0.906	1.000	0.018	0.420	0.469	8.250	9.875	1500	2200
19/32	25/32	0.969	1.250	0.018	0.438	0.594	9.375	11.188	1850	3080
5/8	11/16	1.000	1.094	0.018	0.469	0.500	9.375	11.000	2200	2640
5/8	3/4	1.000	1.156	0.018	0.469	0.594	9.375	11.500	2200	2860
11/16	3/4	1.094	1.156	0.018	0.500	0.594	9.438	11.500	2640	2860
11/16	13/16	1.094	1.344	0.020	0.500	0.594	9.438	12.000	2640	3300
3/4	7/8	1.156	1.375	0.020	0.594	0.625	10.875	13.250	2860	3630
13/16	7/8	1.344	1.375	0.020	0.594	0.625	11.750	14.000	3300	3630
15/16	1	1.469	1.531	0.020	0.688	0.719	13.188	15.750	4510	5390
15/16	1-1/16	1.469	1.688	0.023	0.701	0.790	13.750	16.500	4510	5940
1-1/16	1-1/8	1.688	1.719	0.023	0.790	0.844	15.063	18.000	5940	6490
1-1/16	1-1/4	1.688	1.906	0.023	0.790	0.940	15.875	18.500	5940	7925
1-1/8	1-5/16	1.719	2.060	0.023	0.857	0.906	17.000	19.000	6490	8400
1-1/4	1-5/16	1.906	2.060	0.023	0.940	0.906	17.375	19.500	7925	8400
1-1/4	1-3/8	1.906	2.063	0.023	0.940	0.906	18.250	20.500	7925	8970
1-1/4	1-7/16	1.906	2.188	0.023	0.940	0.953	19.000	21.375	7925	9240
1-7/16	1-1/2	2.188	2.297	0.027	0.953	1.000	21.000	23.000	9240	10365
1-7/16	1-5/8	2.188	2.641	0.027	0.953	1.063	22.000	24.000	9240	12800

**TABLE 2 TYPE I, CLASS 1, STYLE 2, BOX WRENCH, DOUBLE HEAD, 15 deg. OFFSET EACH END,
SHORT LENGTH**

Wrench Opening Across Flats		Outside Diameter of Heads		Permitted Eccentricity of Wrench Openings to Outside Diameter	Thickness of Wrench Heads		Overall Length		Proof Load, Inch-Pounds	
A	B	A	B		A	B			A	B
Small Head	Large Head	Small Head	Large Head		Small Head	Large Head			Small Head	Large Head
		Max.	Max.		Max.	Max.	C		Min.	Min.
1/4	5/16	0.453	0.563	0.015	0.295	0.295	4.000	5.000	220	275
5/16	3/8	0.563	0.625	0.015	0.330	0.344	4.000	5.000	275	605
3/8	7/16	0.625	0.730	0.015	0.344	0.359	4.125	5.125	605	715
7/16	1/2	0.730	0.822	0.015	0.359	0.391	4.250	5.500	715	1020
1/2	9/16	0.822	0.906	0.015	0.391	0.420	4.625	5.625	1020	1500
9/16	5/8	0.906	1.000	0.018	0.420	0.469	5.000	6.000	1500	2200
5/8	11/16	1.000	1.066	0.018	0.469	0.500	5.250	6.250	2200	2640
5/8	3/4	1.000	1.156	0.018	0.469	0.594	5.250	6.250	2200	2860



TABLE 3 TYPE I, CLASS 2, STYLE 1, BOX WRENCH, DOUBLE HEAD, DEEP OFFSET EACH END, REGULAR LENGTH

Wrench Openings Across Flats			Outside Diameter of Heads		Permitted Eccentricity of Wrench Openings to Outside Diameter	Thickness of Wrench Heads		Center Line of Opening to Point Where Offset Blends With Handle			Height To Where Offset Blends With Handle		Overall Length		Proof Load, Inch-Pounds	
A	B		A	B		A	B	C	D	E	F	G	Min.	A	B	
Small Head	Large Head		Small Head	Large Head		Small Head	Large Head	Small Head	Large Head	Small Head	Large Head			Min.	Min.	Small Head
1/4	5/16		0.453	0.551	0.015	0.281	0.297	1.250	1.250	0.375	0.375	6.375	220	275		
3/8	7/16		0.625	0.730	0.015	0.344	0.391	1.250	1.250	0.500	0.500	6.813	605	715		
7/16	1/2		0.730	0.822	0.015	0.359	0.391	1.188	1.438	0.500	0.500	7.750	715	1020		
7/16	9/16		0.730	0.906	0.015	0.391	0.420	1.188	1.438	0.500	0.500	7.750	715	1500		
1/2	9/16		0.822	0.906	0.015	0.391	0.420	1.438	1.438	0.625	0.625	7.969	1020	1500		
9/16	5/8		0.906	1.000	0.018	0.420	0.469	1.438	1.563	0.625	0.625	8.500	1500	2200		
5/8	11/16		1.000	1.094	0.018	0.469	0.500	1.563	1.563	0.719	0.719	9.250	2200	2640		
5/8	3/4		1.000	1.156	0.018	0.469	0.594	1.563	1.563	0.719	0.750	9.750	2200	2860		
11/16	3/4		1.094	1.156	0.018	0.500	0.594	1.563	1.563	0.719	0.750	9.750	2640	2860		
11/16	13/16		1.094	1.344	0.018	0.500	0.594	1.563	1.688	0.750	0.750	10.000	2640	3300		
3/4	7/8		1.156	1.375	0.018	0.594	0.625	1.688	1.688	0.750	0.750	11.250	2860	3630		
13/16	7/8		1.344	1.375	0.020	0.594	0.688	1.688	1.688	0.750	0.750	11.375	3300	3630		
13/16	15/16		1.344	1.469	0.020	0.594	0.688	1.688	2.063	0.750	0.750	11.375	3300	4510		
7/8	15/16		1.625	1.469	0.020	0.625	0.688	1.688	2.063	0.813	0.813	12.000	3630	4510		
15/16	1		1.469	1.531	0.020	0.688	0.719	2.063	2.063	1.000	1.000	13.500	4510	5390		
1-1/16	1-1/8		1.688	1.719	0.023	0.790	0.860	2.188	2.438	1.000	1.000	15.813	5940	6490		
1-1/8	1-3/8		1.719	2.063	0.023	0.860	0.938	2.438	2.563	1.000	1.000	16.000	6490	8970		
1-1/4	1-7/16		1.906	2.227	0.023	0.906	0.938	2.563	2.813	1.000	1.000	18.000	7925	9240		
1-5/16	1-1/2		2.063	2.227	0.027	0.940	1.000	2.563	2.813	1.188	1.188	19.500	8400	10365		
1-3/8	1-1/2		2.063	2.227	0.027	0.940	1.000	2.563	2.813	1.188	1.188	19.500	8970	10365		
1-7/16	1-1/2		2.188	2.227	0.027	0.940	1.000	2.750	2.813	1.188	1.188	20.000	9240	10365		
1-7/16	1-5/8		2.188	2.469	0.027	0.940	1.000	2.750	2.813	1.313	1.313	21.500	9240	12800		
1-1/2	1-11/16		2.227	2.530	0.027	1.000	1.063	2.813	2.813	1.313	1.313	21.000	10365	15400		



TABLE 4 TYPE I, CLASS 2, STYLE 2, BOX WRENCH, DOUBLE HEAD, DEEP OFFSET EACH END, SHORT LENGTH

Wrench Opening Across Flats			Outside Diameter of Heads		Permitted Eccentricity of Wrench Openings to Outside Diameter	Thickness of Wrench Heads		Center Line of Opening to Point Where Offset Blends With Handle			Height To Where Offset Blends With Handle		Overall Length		Proof Load, Inch-Pounds
A	B	A	B	A		B	C	D	E	F	G				
											Small Head	Large Head	Min.	Max.	
Small Head	Large Head	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Min.	Min.	Min.	Min.	Min.	Min.
3/16	13/64	0.359	0.391	0.015	0.172	0.172	0.906	0.906	0.188	0.250	2.750	3.000	165	165	165
3/16	7/32	0.375	0.406	0.015	0.203	0.234	0.563	0.625	0.188	0.281	2.750	4.000	150	165	165
7/32	15/64	0.391	0.406	0.015	0.188	0.203	0.969	1.031	0.375	0.281	3.000	3.250	165	184	184
1/4	9/32	0.453	0.469	0.015	0.220	0.250	1.125	1.125	0.219	0.281	3.375	4.375	220	248	248
1/4	5/16	0.453	0.563	0.015	0.295	0.330	1.125	1.375	0.375	0.375	3.875	5.000	220	275	275
5/16	11/32	0.563	0.612	0.015	0.330	0.309	1.125	0.875	0.297	0.344	3.750	5.000	275	275	275
5/16	3/8	0.563	0.625	0.015	0.330	0.344	1.125	0.938	0.450	0.500	4.000	5.000	275	605	605
3/8	7/16	0.656	0.730	0.015	0.344	0.359	1.188	1.188	0.500	0.500	4.250	5.500	605	715	715
7/16	1/2	0.730	0.822	0.015	0.359	0.391	1.188	1.438	0.563	0.563	4.750	5.750	715	1020	1020
1/2	9/16	0.822	0.906	0.015	0.391	0.420	1.438	1.438	0.563	0.563	5.000	6.250	1020	1500	1500
9/16	5/8	0.906	1.000	0.018	0.420	0.469	1.438	1.563	0.625	0.625	5.250	6.375	1500	2200	2200
5/8	11/16	1.000	1.109	0.018	0.469	0.531	1.563	1.563	0.719	0.719	5.500	6.781	2200	2640	2640
5/8	3/4	1.000	1.156	0.018	0.469	0.594	1.563	1.688	0.719	0.813	5.750	6.750	2200	2860	2860
11/16	13/16	1.109	1.281	0.018	0.531	0.609	1.563	1.688	0.719	0.813	6.500	7.250	2640	3300	3300



TABLE 5 TYPE I, CLASS 2, STYLE 1, BOX WRENCH, DOUBLE HEAD, MODIFIED OFFSET, REGULAR LENGTH

Wrench Openings Across Flats			Outside Diameter of Heads		Permitted Eccentricity of Wrench Openings to Outside Diameter	Thickness of Wrench Heads		Center Line of Opening to Point Where Offset Blends With Handle		Height To Where Offset Blends With Handle		Overall Length		Proof Load, Inch-Pounds	
A	B	A	B		A	B	C	D	E	F	G	A	B		
Small Head	Large Head	Small Head	Large Head		Small Head	Large Head	Small Head	Large Head	Small Head	Large Head		Small Head	Large Head		
		Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Min.	Min.	Min.	Min.		
3/8	7/16	0.656	0.719	0.015	0.344	0.368	1.188	1.375	0.313	0.344	7.375	605	715		
7/16	1/2	0.719	0.813	0.015	0.368	0.391	1.375	1.603	0.344	0.375	7.750	715	1020		
1/2	9/16	0.813	0.906	0.015	0.391	0.414	1.603	1.636	0.375	0.375	8.500	1020	1500		
9/16	5/8	0.906	1.000	0.018	0.414	0.531	1.792	1.850	0.438	0.500	8.750	1500	2200		
5/8	11/16	1.000	1.063	0.018	0.531	0.535	2.051	2.217	0.500	0.500	9.625	2200	2640		
5/8	3/4	1.000	1.156	0.018	0.531	0.594	2.051	2.138	0.500	0.500	9.750	2200	2860		
11/16	3/4	1.094	1.156	0.018	0.535	0.594	2.217	2.276	0.563	0.500	10.000	2640	2860		
3/4	13/16	1.156	1.344	0.018	0.594	0.594	2.276	2.477	0.625	0.625	11.000	2860	3300		
3/4	7/8	1.156	1.375	0.018	0.594	0.625	2.276	2.518	0.625	0.625	11.250	2860	3630		
13/16	7/8	1.344	1.375	0.020	0.594	0.625	2.477	2.518	0.670	0.688	11.500	3300	3630		
7/8	15/16	1.375	1.469	0.020	0.625	0.688	2.518	2.790	0.688	0.688	12.000	3630	4510		
15/16	1	1.438	1.531	0.020	0.688	0.719	2.790	2.826	0.750	0.750	13.000	4510	5390		
1	1-1/16	1.531	1.688	0.020	0.719	0.781	2.826	3.151	0.813	0.875	13.875	5390	5940		
1-1/16	1-1/8	1.688	1.719	0.023	0.781	0.844	3.151	3.689	0.875	0.875	14.500	5940	6490		
1-1/16	1-1/4	1.688	1.906	0.023	0.781	0.906	3.500	3.750	0.875	0.875	15.000	5940	7925		
1-1/8	1-3/16	1.719	1.813	0.023	0.844	0.890	3.687	3.875	0.875	0.875	14.750	6490	6490		
1-1/8	1-5/16	1.719	2.000	0.023	0.844	0.906	3.875	4.000	0.875	0.875	15.500	6490	8400		
1-3/16	1-5/16	1.813	2.000	0.023	0.906	0.813	3.875	4.125	0.875	0.875	16.000	6490	8400		
1-1/4	1-5/16	1.906	2.000	0.023	0.906	0.828	4.125	4.250	0.875	0.875	16.000	7925	8400		
1-3/8	1-7/16	2.050	2.187	0.027	0.940	0.950	4.250	4.375	1.125	1.175	17.500	8970	9240		
1-1/2	1-5/8	2.200	2.350	0.027	1.000	1.000	4.375	4.500	1.225	1.325	18.500	10365	12800		



TABLE 6 TYPE I, CLASS 2, STYLE 2, BOX WRENCH, DOUBLE HEAD, MODIFIED OFFSET EACH END, SHORT LENGTH

Wrench Opening Across Flats		Outside Diameter of Heads		Permitted Eccentricity of Wrench Openings to Outside Diameter	Thickness of Wrench Heads		Center Line of Opening to Point Where Offset Blends With Handle		Height To Where Offset Blends With Handle		Overall Length G		Proof Load, Inch-Pounds	
A	B	A	B		A	B	C	D	E	F			A	B
Small Head	Large Head	Small Head	Large Head	Max.	Small Head	Large Head	Small Head	Large Head	Small Head	Large Head	Min.	Max.	Small Head	Large Head
		Max.	Max.		Max.	Max.	Max.	Max.	Min.	Min.	Min.	Max.	Min.	Min.
3/16	13/64	0.359	0.391	0.015	0.172	0.172	0.906	0.906	0.156	0.188	2.750	3.000	165	165
7/32	15/64	0.391	0.406	0.015	0.188	0.203	0.969	1.125	0.188	0.219	3.000	3.250	165	184
1/4	9/32	0.453	0.469	0.015	0.250	0.250	1.125	1.125	0.219	0.219	3.350	3.475	220	248
1/4	5/16	0.453	0.563	0.015	0.266	0.297	1.125	1.125	0.219	0.281	3.375	4.750	220	275
5/16	11/32	0.563	0.578	0.015	0.297	0.281	1.125	1.188	0.275	0.281	3.375	4.750	275	275
5/16	3/8	0.563	0.625	0.015	0.297	0.344	1.125	1.188	0.281	0.287	4.000	5.000	275	605
3/8	7/16	0.719	0.719	0.015	0.344	0.359	1.188	1.188	0.287	0.295	4.250	5.250	605	715
7/16	1/2	0.719	0.813	0.015	0.359	0.391	1.188	1.438	0.344	0.297	4.750	5.750	715	1020
1/2	9/16	0.813	0.906	0.015	0.391	0.406	1.438	1.438	0.297	0.386	5.000	6.000	1020	1500
9/16	5/8	0.906	1.000	0.018	0.406	0.469	1.438	1.563	0.386	0.452	5.250	6.250	1500	2200
5/8	11/16	1.000	1.045	0.018	0.469	0.500	1.563	1.563	0.452	0.461	5.500	6.500	2200	2640
5/8	3/4	1.000	1.156	0.018	0.469	0.594	1.563	1.688	0.500	0.688	5.750	6.750	2200	2860



**TABLE 7A TYPE II, STYLE 1, ENGINEER'S WRENCH, DOUBLE HEAD, OPEN
END, 15 deg., REGULAR LENGTH**

Wrench Opening Across Flats		Width of Heads		Thickness of Wrench Heads		Overall Length	Proof Load, Inch-Pounds	
A	B	A	B	A	B		A	B
Small Head	Large Head	Small Head	Large Head	Small Head	Large Head		Small Head	Large Head
		Max.	Max.	Max.	Max.	Min.	Min.	Min.
3/16	7/32	0.438	0.500	0.156	0.156	2.625	25	40
3/16	1/4	0.469	0.625	0.156	0.203	3.000	35	65
1/4	5/16	0.625	0.781	0.203	0.203	3.000	65	138
5/16	11/32	0.781	0.813	0.203	0.203	3.625	138	193
5/16	3/8	0.781	0.875	0.219	0.234	3.625	138	275
5/16	7/16	0.781	0.875	0.219	0.219	3.625	138	275
3/8	7/16	0.875	0.984	0.250	0.250	4.375	275	413
3/8	1/2	0.875	1.109	0.234	0.266	4.250	275	550
13/32	1/2	0.875	1.109	0.234	0.266	4.250	325	550
7/16	1/2	0.984	1.109	0.266	0.266	5.000	413	550
1/2	9/16	1.109	1.250	0.344	0.375	5.500	550	770
9/16	5/8	1.250	1.391	0.328	0.328	6.000	770	1100
5/8	11/16	1.391	1.531	0.375	0.391	7.000	1100	1375
5/8	3/4	1.391	1.656	0.375	0.375	7.000	1100	1650
11/16	3/4	1.531	1.656	0.375	0.375	7.000	1375	1650
11/16	13/16	1.531	1.828	0.375	0.375	7.500	1375	2200
3/4	13/16	1.656	1.828	0.375	0.375	8.000	1650	2200
3/4	7/8	1.656	1.938	0.391	0.391	8.000	1650	2475
13/16	7/8	1.828	1.938	0.406	0.406	8.250	2200	2475
13/16	15/16	1.828	2.063	0.406	0.422	9.000	2200	3025
7/8	15/16	1.938	2.063	0.406	0.422	9.000	2475	3025
7/8	1	1.938	2.250	0.422	0.469	9.000	2475	3575
7/8	1-1/16	1.938	2.344	0.422	0.500	9.750	2475	3850
15/16	1	2.078	2.250	0.432	0.469	9.875	3025	3575
15/16	1-1/16	2.078	2.344	0.432	0.500	10.000	3025	3850
1	1-1/16	2.250	2.344	0.594	0.625	10.500	3575	3850
1	1-1/8	2.250	2.494	0.469	0.516	10.250	3575	4400
1	1-1/2	2.250	3.188	0.469	0.625	11.000	3575	8500
1-1/16	1-1/8	2.344	2.494	0.516	0.516	11.750	3850	4400
1-1/16	1-1/4	2.344	2.750	0.516	0.531	11.750	3850	5775
1-1/8	1-1/4	2.494	2.750	0.516	0.531	11.750	4400	5775
1-1/8	1-5/16	2.494	2.890	0.516	0.563	12.000	4400	6600
1-1/8	1-3/8	2.494	3.030	0.516	0.563	13.000	4400	6600
1-3/16	1-5/16	2.625	2.890	0.563	0.563	13.000	5000	6600
1-1/4	1-5/16	2.750	2.890	0.563	0.563	13.500	5775	6600
1-1/4	1-3/8	2.750	3.030	0.563	0.563	13.500	5775	7425
1-1/4	1-7/16	2.750	3.180	0.563	0.594	13.500	5775	8250
1-3/8	1-7/16	3.030	3.180	0.563	0.594	14.000	7425	8250
1-3/8	1-1/2	3.030	3.315	0.563	0.640	15.500	7425	8500
1-7/16	1-5/8	3.180	3.625	0.594	0.675	15.500	8250	9000
1-7/16	1-13/16	3.180	4.000	0.625	0.735	15.500	8250	9000
1-1/2	1-5/8	3.315	3.625	0.640	0.675	15.500	8500	9000



**TABLE 7B TYPE II, STYLE 2, ENGINEER'S WRENCH, DOUBLE HEAD, OPEN END, 15 deg.,
SHORT LENGTH**

Wrench Opening Across Flats		Width of Heads		Thickness of Wrench Heads		Overall Length	Proof Load, Inch-Pounds	
A	B	A	B	A	B		A	B
Small Head	Large Head	Small Head	Large Head	Small Head	Large Head		Small Head	Large Head
		Max.	Max.	Max.	Max.	Max.	Min.	Min.
3/16	7/32	0.438	0.500	0.156	0.156	1.375	25	40
3/16	1/4	0.469	0.625	0.156	0.203	3.000	35	65
1/4	9/32	0.625	0.703	0.203	0.203	3.188	65	102
1/4	5/16	0.625	0.781	0.203	0.203	3.250	65	138
5/16	11/32	0.781	0.813	0.203	0.203	3.625	138	193
5/16	3/8	0.781	0.875	0.219	0.234	3.625	138	275
3/8	7/16	0.875	0.984	0.250	0.250	4.375	275	413
3/8	1/2	0.875	1.109	0.234	0.266	4.250	275	550
13/32	1/2	0.875	1.109	0.234	0.266	4.250	325	550
7/16	1/2	0.984	1.109	0.266	0.266	5.000	413	550
1/2	9/16	1.109	1.250	0.344	0.375	5.750	550	770
9/16	5/8	1.250	1.391	0.328	0.328	6.000	770	1100
5/8	11/16	1.391	1.531	0.375	0.391	7.250	1100	1375
5/8	3/4	1.391	1.656	0.375	0.375	7.000	1400	1650
3/4	13/16	1.656	1.828	0.375	0.375	8.000	1650	2200
3/4	7/8	1.656	1.938	0.391	0.391	8.000	1650	2475
13/16	7/8	1.828	1.938	0.406	0.406	8.250	2200	2475
13/16	15/16	1.828	2.078	0.406	0.422	9.000	2200	3025
7/8	15/16	1.938	2.078	0.406	0.422	9.000	2475	3025
7/8	1	1.938	2.250	0.422	0.469	9.000	2475	3575
7/8	1-1/16	1.938	2.344	0.422	0.500	10.000	2475	3850
15/16	1	2.078	2.250	0.432	0.469	10.000	3025	3575
15/16	1-1/16	2.078	2.344	0.432	0.500	10.000	3025	3850
1	1-1/16	2.250	2.344	0.594	0.625	10.500	3575	3850
1	1-1/8	2.250	2.494	0.469	0.516	10.750	3575	4400
1	1-1/2	2.250	3.188	0.469	0.625	11.000	3575	8500
1-1/16	1-1/8	2.344	2.494	0.516	0.516	11.750	3850	4400
1-1/16	1-1/4	2.344	2.750	0.516	0.531	11.750	3850	5775
1-1/8	1-1/4	2.494	2.750	0.516	0.531	11.750	4400	5775
1-1/8	1-5/16	2.494	2.905	0.516	0.563	12.000	4400	6600
1-3/16	1-5/16	2.625	2.905	0.563	0.563	13.000	5000	6600
1-1/4	1-5/16	2.750	2.905	0.563	0.563	13.500	5775	6600
1-1/4	1-3/8	2.750	3.042	0.563	0.563	13.500	5775	7425
1-1/4	1-7/16	2.750	3.179	0.563	0.594	13.500	5775	8250
1-3/8	1-7/16	3.042	3.179	0.563	0.594	14.000	7425	8250
1-3/8	1-1/2	3.042	3.315	0.563	0.640	15.500	7425	8500
1-7/16	1-5/8	3.179	3.625	0.594	0.675	15.500	8250	9000
1-1/2	1-5/8	3.315	3.625	0.640	0.675	15.500	8500	9000



**TABLE 8A TYPE III, STYLE 1, COMBINATION WRENCH, OPEN END, 15 deg. OFFSET BOX OPENING,
REGULAR LENGTH**

Wrench Opening Cross Flats	Width of Open Head	Outside Diameter of Box	Permitted Eccentricity of Box Wrench Openings to Outside Diameter	Thickness of Heads		Overall Length		Proof Load, Inch-Pounds	
				Open Head	Box Head			Open Head	Box Head
	Max.	Max.	Max.	Max.	Max.	Min.	Max.	Min.	Min.
7/8	0.359	0.297	0.015	0.141	0.172	2.500	4.000	20	60
1/32	0.438	0.313	0.015	0.141	0.156	2.750	4.250	35	90
3/16	0.500	0.344	0.015	0.156	0.172	2.875	4.500	45	150
1/32	0.563	0.391	0.015	0.172	0.219	3.000	4.750	50	165
1/4	0.625	0.453	0.015	0.188	0.250	3.000	5.000	67	220
3/32	0.688	0.469	0.015	0.188	0.250	3.281	5.250	78	248
1/16	0.781	0.563	0.015	0.203	0.291	3.250	5.500	138	275
11/32	0.813	0.578	0.015	0.203	0.291	3.250	5.750	193	275
3/8	0.875	0.625	0.015	0.250	0.344	4.188	6.000	275	605
1/16	0.984	0.719	0.015	0.281	0.359	4.969	7.000	413	715
1/2	1.125	0.813	0.015	0.344	0.391	5.250	8.000	550	1020
3/16	1.250	0.906	0.018	0.375	0.406	5.750	9.000	770	1500
5/8	1.391	1.000	0.018	0.375	0.469	6.125	10.000	1100	2200
11/16	1.531	1.094	0.018	0.391	0.500	6.500	11.000	1375	2640
3/4	1.672	1.156	0.018	0.406	0.594	6.813	12.000	1650	2860
13/16	1.828	1.344	0.020	0.516	0.594	7.125	13.000	2200	3300
7/8	1.938	1.375	0.020	0.516	0.625	9.688	14.000	2475	3630
15/16	2.078	1.469	0.020	0.594	0.688	10.500	15.000	3025	4510
1	2.250	1.531	0.020	0.594	0.719	11.375	15.500	3575	5390
1-1/16	2.344	1.688	0.023	0.625	0.781	13.000	16.000	3850	5940
1-1/8	2.500	1.719	0.023	0.656	0.844	14.500	17.000	4400	6430
1-3/16	2.630	1.813	0.023	0.688	0.875	15.000	18.000	5200	7200
1-1/4	2.766	1.906	0.023	0.719	0.906	16.000	19.000	5775	7920
1-5/16	2.938	2.000	0.027	0.719	0.906	17.500	20.000	6600	8400
1-3/8	3.063	2.094	0.027	0.750	0.938	18.000	21.500	7425	8970
1-7/16	3.188	2.203	0.027	0.813	0.953	18.500	22.250	8250	9240
1-1/2	3.375	2.297	0.027	0.813	0.969	19.000	23.000	8500	10365
1-9/16	3.563	2.438	0.027	0.813	1.031	19.500	23.500	8750	11495
1-5/8	3.625	2.641	0.031	0.813	1.063	20.750	24.500	9000	12800
1-11/16	3.750	2.641	0.031	0.813	1.063	20.750	25.000	10500	13570
1-3/4	4.000	2.938	0.031	0.875	1.125	23.938	26.500	11100	14300
1-13/16	4.188	2.938	0.037	0.875	1.125	23.938	27.500	11750	15100
1-7/8	4.344	3.125	0.037	0.938	1.125	23.938	29.000	12400	15900
2	4.469	3.125	0.037	0.938	1.125	23.938	29.000	13650	17400
2-1/16	4.594	3.313	0.037	0.938	1.234	23.938	30.000	14300	18200
2-1/8	5.000	3.313	0.046	0.938	1.234	26.000	30.000	14900	19000
2-3/16	5.000	3.313	0.046	0.938	1.234	26.000	30.000	15500	19700
2-1/4	5.000	3.313	0.05	0.938	1.234	26.000	30.000	16200	20500



**TABLE 8B TYPE III, STYLE 3, COMBINATION WRENCH, OPEN END, 15 deg. OFFSET BOX
OPENING, LONG LENGTH**

Wrench Opening Across Flats	Width of Open Head	Outside Diameter of Box	Permitted Eccentricity of Box Wrench Openings to Outside Diameter	Thickness of Heads		Overall Length	Proof Load, Inch-Pounds	
				Open Head	Box Head		Open Head	Box Head
	Max.	Max.	Max.	Max.	Max.	Min.	Min.	Min.
1/4	0.625	0.453	0.015	0.188	0.250	4.250	67	220
9/32	0.688	0.469	0.015	0.188	0.250	4.500	78	248
5/16	0.781	0.563	0.015	0.203	0.291	5.000	138	275
11/32	0.813	0.578	0.015	0.203	0.291	5.500	193	275
3/8	0.875	0.625	0.015	0.250	0.344	5.938	275	605
7/16	0.984	0.719	0.015	0.281	0.359	6.375	413	715
1/2	1.125	0.813	0.015	0.344	0.359	6.938	550	1020
9/16	1.250	0.906	0.018	0.375	0.406	7.500	770	1500
5/8	1.391	1.000	0.018	0.380	0.469	8.125	1100	2200
11/16	1.531	1.094	0.018	0.391	0.500	8.938	1375	2640
3/4	1.672	1.156	0.018	0.406	0.594	9.750	1650	2860
13/16	1.828	1.344	0.020	0.516	0.609	10.500	2200	3300
7/8	1.938	1.375	0.020	0.516	0.625	11.500	2475	3630
15/16	2.078	1.469	0.020	0.594	0.688	12.500	3025	4510
1	2.250	1.531	0.020	0.625	0.719	13.500	3575	5390
1-1/16	2.344	1.688	0.023	0.625	0.781	14.500	3850	5940
1-1/8	2.500	1.719	0.023	0.656	0.844	15.750	4400	6430
1-3/16	2.630	1.813	0.023	0.688	0.875	17.125	5200	7200
1-1/4	2.766	1.906	0.023	0.719	0.906	17.250	5775	7920
1-5/16	2.938	2.030	0.027	0.719	0.906	18.750	6600	8400
1-3/8	3.063	2.094	0.027	0.750	0.938	19.750	7425	8970
1-7/16	3.188	2.203	0.027	0.750	0.953	20.750	8250	9240
1-1/2	3.375	2.297	0.027	0.813	0.969	21.750	8500	10365
1-9/16	3.563	2.438	0.027	0.813	1.031	22.250	8750	11495
1-5/8	3.625	2.641	0.031	0.813	1.063	22.750	9000	12800
1-11/16	3.750	2.641	0.031	0.813	1.063	23.750	10500	13570
1-3/4	4.000	2.938	0.031	0.875	1.125	24.750	11100	14300
1-13/16	4.188	2.938	0.037	0.875	1.125	25.750	11750	15100
1-7/8	4.344	3.125	0.037	0.938	1.125	26.750	12400	15900
2	4.469	3.125	0.037	0.938	1.125	27.750	13650	17400



**TABLE 8C TYPE III, STYLE 2, COMBINATION WRENCH, OPEN END, 15 deg. OFFSET BOX OPENING,
SHORT LENGTH**

Wrench Opening Across Flats	Width of Open Head Max.	Outside Diameter of Box Max.	Permitted Eccentricity of Box Wrench Openings to Outside Diameter Max.	Thickness of Heads		Overall Length Max.	Proof Load, Inch-Pounds	
				Open Head Max.	Box Head Max.		Open Head Min.	Box Head Min.
7/16	0.984	0.719	0.015	0.281	0.359	5.126	413	715
1/2	1.125	0.813	0.015	0.344	0.359	5.376	550	1020
9/16	1.250	0.906	0.018	0.375	0.406	5.876	770	1500
5/8	1.391	1.000	0.018	0.380	0.469	6.251	1100	2200
11/16	1.531	1.094	0.018	0.391	0.500	7.126	1375	2640
3/4	1.672	1.156	0.018	0.406	0.594	7.165	1650	2860
13/16	1.828	1.344	0.020	0.516	0.609	7.205	2200	3300
7/8	1.938	1.375	0.020	0.516	0.625	7.750	2475	3630
15/16	2.078	1.469	0.020	0.594	0.688	8.100	3025	4510
1	2.225	1.531	0.020	0.625	0.719	8.500	3575	5390
1-1/16	2.195	1.590	0.023	0.625	0.781	8.750	3850	5940
1-1/8	2.325	1.650	0.023	0.656	0.844	9.100	4400	6430
1-3/16	2.445	1.740	0.023	0.688	0.875	9.400	5200	7200
1-1/4	2.598	1.870	0.023	0.719	0.906	9.750	5775	7920
1-5/16	2.695	2.030	0.027	0.719	0.906	10.100	6600	8400
1-3/8	2.825	2.050	0.027	0.750	0.938	10.300	7425	8970



TABLE 9 TYPE IV, FLARE NUT WRENCH, DOUBLE HEAD

Wrench Opening Across Flats		Outside Diameter of Heads		Circumferential Opening <i>B</i>		Thickness of Wrench Heads		Overall Length	Proof Load, Inch-Pounds	
Small Head	Large Head	Small Head	Large Head	Small Head	Large Head	Small Head	Large Head		Small Head	Large Head
		Max.	Max.	Min.	Min.	Max.	Max.		Min.	Min.
1/4	5/16	0.656	0.750	0.109	0.141	0.291	0.313	3.750	70	115
5/16	3/8	0.750	0.875	0.141	0.203	0.330	0.375	4.500	115	130
3/8	7/16	0.875	0.938	0.188	0.250	0.375	0.406	4.875	130	140
7/16	1/2	0.938	1.156	0.250	0.313	0.406	0.438	5.500	140	200
1/2	9/16	1.156	1.188	0.313	0.344	0.438	0.469	5.625	200	275
5/8	11/16	1.281	1.438	0.406	0.438	0.625	0.625	6.250	325	396
5/8	3/4	1.281	1.438	0.406	0.438	0.625	0.625	6.750	325	500
5/8	13/16	1.281	1.438	0.406	0.531	0.625	0.625	7.000	325	650
3/4	13/16	1.438	1.438	0.438	0.531	0.625	0.625	7.000	500	650
3/4	7/8	1.438	1.625	0.438	0.531	0.625	0.625	7.000	500	800
3/4	1	1.438	1.750	0.438	0.656	0.625	0.813	8.000	500	800
7/8	15/16	1.563	1.625	0.531	0.578	0.625	0.750	8.500	800	900
7/8	1	1.563	1.750	0.531	0.656	0.625	0.813	9.250	800	1000
7/8	1-1/8	1.563	1.938	0.531	0.750	0.625	0.875	8.000	800	1000
15/16	1-1/16	1.750	1.813	0.656	0.656	0.813	0.813	8.000	900	1000
1	1-1/16	1.750	1.813	0.656	0.656	0.688	0.750	9.000	1000	1000

TABLE 10 TYPE V, FLARE NUT COMBINATION WRENCH, OPEN END

Wrench Opening Across Flats	Outside Diameter of Heads		Circumferential Opening <i>B</i>	Thickness of Wrench Heads		Overall Length	Proof Load, Inch-Pounds	
	Open Head	Flare Head		Open Head	Flare Head		Open Head	Flare Head
	Max.	Max.		Max.	Max.		Min.	Min.
5/16	0.797	0.750	0.141	0.344	0.344	4.500	138	115
3/8	0.875	0.875	0.188	0.391	0.391	4.875	275	130
7/16	1.016	0.938	0.250	0.422	0.406	5.375	413	140
1/2	1.219	1.156	0.313	0.438	0.453	5.625	550	200
9/16	1.281	1.188	0.344	0.484	0.469	5.750	770	275
5/8	1.406	1.281	0.406	0.484	0.625	6.250	1100	325
11/16	1.563	1.438	0.438	0.547	0.625	7.000	1375	396
3/4	1.672	1.438	0.438	0.563	0.625	7.500	1650	500
13/16	1.828	1.438	0.531	0.563	0.625	8.000	2100	650
7/8	1.938	1.641	0.531	0.594	0.625	8.500	2475	800
15/16	2.094	1.656	0.578	0.625	0.625	9.000	3025	900
1	2.250	1.750	0.656	0.750	0.750	10.000	3575	1000



**TABLE 11A TYPE VI, STYLE 2 AND 3 ANGLE WRENCH,
DOUBLE HEAD, OPEN END**

Wrench Opening Across Flats	Width of Open Head	Thickness of Heads	Overall Length	Proof Load, Inch-Pounds
	Max.	Max.	Max.	Min.
1/4	0.600	0.219	4.000	61
5/16	0.703	0.219	4.500	125
11/32	0.766	0.219	4.750	175
3/8	0.841	0.250	4.875	250
7/16	0.978	0.250	5.438	375
1/2	1.115	0.281	6.000	500
9/16	1.250	0.281	6.625	700
5/8	1.389	0.313	7.188	1000
11/16	1.526	0.313	7.813	1250
3/4	1.663	0.344	8.313	1500
13/16	1.800	0.350	8.938	2000
7/8	1.938	0.365	9.500	2250
15/16	2.073	0.400	10.063	2750
1	2.210	0.463	10.625	3250
1-1/16	2.340	0.475	11.219	3500
1-1/8	2.474	0.510	11.813	4000
1-3/16	2.610	0.510	12.375	4600
1-1/4	2.750	0.510	12.938	5250
1-5/16	2.885	0.530	13.500	6000
1-3/8	3.025	0.530	14.125	6650
1-7/16	3.160	0.575	14.750	7300
1-1/2	3.295	0.635	15.250	7975
1-5/8	3.570	0.670	16.438	9300
1-11/16	3.705	0.690	17.000	9950
1-3/4	3.845	0.700	17.625	10600
1-13/16	3.980	0.730	19.000	11250
1-7/8	4.250	0.750	20.500	11900
2	4.390	0.780	22.000	13250



**TABLE 11B TYPE VI, STYLE 1 ANGLE WRENCH, DOUBLE HEAD, OPEN END, 15 deg. AND
60 deg. HEADS**

Wrench Opening Across Flats		Width of Heads		Thickness of Wrench Heads		Overall Length	Proof Load, Inch-Pounds	
A	B	A	B	A	B		A	B
15 deg. Head	60 deg. Head	15 deg. Head	60 deg. Head	15 deg. Head	60 deg. Head		15 deg. Head	60 deg. Head
		Max.	Max.	Max.	Max.	Max.	Min.	Min.
1/8	1/8	0.350	0.350	0.123	0.123	3.130	15	15
5/32	5/32	0.386	0.386	0.128	0.128	3.190	20	20
3/16	3/16	0.450	0.450	0.133	0.133	3.280	24	24
7/32	7/32	0.520	0.520	0.135	0.135	3.380	28	28
15/64	1/4	0.496	0.560	0.141	0.141	3.370	38	38
1/4	15/64	0.560	0.496	0.141	0.141	3.440	38	38
1/4	1/4	0.560	0.560	0.141	0.141	3.500	38	38
9/32	9/32	0.630	0.630	0.150	0.150	3.590	43	43
9/32	5/16	0.630	0.700	0.150	0.150	3.560	62	62
5/16	9/32	0.700	0.630	0.150	0.150	3.690	62	62
5/16	5/16	0.700	0.700	0.150	0.150	3.720	76	76
11/32	11/32	0.765	0.765	0.160	0.160	3.840	106	106
11/32	3/8	0.765	0.835	0.160	0.160	3.810	105	105
3/8	11/32	0.835	0.765	0.160	0.160	3.940	105	105
3/8	3/8	0.835	0.835	0.160	0.160	3.970	151	151

TABLE 12 TYPE VII, CLASS 1, TAPPET WRENCH, DOUBLE HEAD, OPEN END, 15 deg.

Wrench Opening Across Flats		Width of Heads		Head Thickness	Overall Length	Proof Load, Inch-Pounds	
A	B	A	B	A		Small Head	Large Head
Small Head	Large Head	Small Head	Large Head	Both Heads		Min.	Min.
		Max.	Max.	Max.	Min.	Min.	Min.
5/16	3/8	0.750	0.938	0.218	5.7	75	120
3/8	7/16	0.938	1.187	0.218	5.7	120	165
7/16	1/2	1.187	1.290	0.218	6.0	165	286
7/16	17/32	1.187	1.290	0.218	6.0	165	300
1/2	9/16	1.290	1.393	0.218	6.3	286	355
9/16	5/8	1.437	1.500	0.218	6.5	355	432
5/8	11/16	1.495	1.598	0.234	7.0	432	516
11/16	3/4	1.598	1.705	0.234	7.5	516	607
3/4	7/8	1.705	1.990	0.234	8.0	607	812
13/16	7/8	1.840	1.980	0.234	8.5	710	812
15/16	1	2.115	2.250	0.250	8.7	941	1053
1-1/16	1-1/8	2.357	2.494	0.240	10.0	1318	1494
1-1/4	1-5/16	2.768	2.905	0.260	11.0	1886	2100
1-3/8	1-7/16	3.042	3.179	0.277	12.0	2326	2564
1-1/2	1-5/8	3.315	3.589	0.291	13.0	2815	3353
1-11/16	1-7/8	3.725	4.136	0.315	14.0	3641	4550



**TABLE 13 TYPE VIII, CLASS 2, TAPPET WRENCH, SINGLE HEAD,
OPEN END, 15 deg.**

Wrench Openings Across Flats	Head Width	Head Thickness	Overall Length		Proof Load, Inch-Pounds
	Max.	Max.	Min.	Max.	Min.
7/16	1.156	0.188	11.875	15.0	200
1/2	1.250	0.188	11.875	15.0	300
9/16	1.312	0.194	11.875	15.0	400
5/8	1.437	0.194	11.875	15.0	525
11/16	1.562	0.219	11.875	15.0	775
3/4	1.703	0.219	11.875	15.0	900
13/16	1.812	0.225	11.875	15.0	1000
7/8	1.987	0.238	11.875	15.0	1000



**TABLE 14 HEXAGON MANDREL DIMENSIONS
(INCHES)**

Nominal Size of Wrench Opening	Hexagon Mandrel Dimensions	
	Across Flats Tolerances	Across Corners Minimum (Note 1)
1/8	+ 0.001 – 0.002	0.1380
5/32	+ 0.001 – 0.002	0.1745
3/16	+ 0.001 – 0.002	0.2095
7/32	+ 0.001 – 0.002	0.2440
1/4	+ 0.001 – 0.002	0.2780
9/32	+ 0.001 – 0.002	0.3133
5/16	+ 0.001 – 0.002	0.3495
11/32	+ 0.001 – 0.002	0.3860
3/8	+ 0.001 – 0.002	0.4225
7/16	+ 0.001 – 0.002	0.4935
1/2	+ 0.001 – 0.003	0.5635
17/32	+ 0.001 – 0.003	0.5990
9/16	+ 0.001 – 0.003	0.6339
19/32	+ 0.001 – 0.003	0.6700
5/8	+ 0.001 – 0.003	0.7055
11/16	+ 0.001 – 0.003	0.7769
3/4	+ 0.001 – 0.003	0.8485
25/32	+ 0.001 – 0.003	0.8840
13/16	+ 0.001 – 0.003	0.9201
7/8	+ 0.001 – 0.003	0.9917
15/16	+ 0.001 – 0.003	1.0631
1	+ 0.001 – 0.003	1.1297
1-1/16	+ 0.001 – 0.003	1.2013
1-1/8	+ 0.001 – 0.003	1.2728
1-3/16	+ 0.001 – 0.003	1.3443
1-1/4	+ 0.001 – 0.003	1.4160
1-5/16	+ 0.001 – 0.003	1.4870
1-3/8	+ 0.001 – 0.003	1.5590
1-7/16	+ 0.001 – 0.003	1.6310
1-1/2	+ 0.001 – 0.003	1.7020
1-9/16	+ 0.001 – 0.007	1.7700
1-5/8	+ 0.001 – 0.007	1.8410
1-11/16	+ 0.001 – 0.007	1.9120
1-3/4	+ 0.001 – 0.007	1.9830
1-13/16	+ 0.001 – 0.007	2.0540
1-7/8	+ 0.001 – 0.007	2.1240
1-15/16	+ 0.001 – 0.007	2.1950
2	+ 0.001 – 0.007	2.2660
2-1/16	+ 0.001 – 0.007	2.3370
2-1/8	+ 0.001 – 0.007	2.4080
2-3/16	+ 0.001 – 0.007	2.4790
2-1/4	+ 0.001 – 0.007	2.5490

NOTE:

(1) Calculated by $(N \times 1.155) - (N \times 1.155 \times 0.0190)$.
Applicable to mandrels over 1 1/2 in nominal size.



AMERICAN NATIONAL STANDARDS FOR HAND TOOLS

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