

Errata to ASME B107.9M-1994

The Errata corrections listed below apply to ASME B107.9M-1994, Wrenches, Box, Angled, Open End, Combination, Flare Nut, and Tappet (Metric Series). This Errata is being issued in the form of replacement pages. Corrections are incorporated directly into the affected pages. Replace or insert the pages listed. It is also advisable that this cover page be retained for reference. The pages show the corrections given below. The pages not listed are the reverse sides of the listed pages and contain no changes.

Page	Location	Change
viii	Contents	<i>Title of Table 10B corrected to read Type VI, Style 1, Angle Wrench, Double Head, Open End, 15 deg. and 60 deg.</i>
1	3	<i>In third paragraph B107.17M corrected to read B107.17M-1991</i>
3	Fig. 1	<i>In top sketch:</i> <i>(1) R_2 added to upper left-hand arrow</i> <i>(2) Callout added to upper portion of right-hand arc</i> <i>(3) In lower left, 30 deg. corrected to read 30</i> <i>(4) In lower right, callouts R_1 = Flash permissible and R_2 = No flash added</i> <i>In bottom sketch:</i> <i>(1) In lower left, 30 deg. corrected to read 30</i>
4	Fig. 6	<i>Word or added to arrows between two bottom sketches</i>
	Fig. 7	<i>$\theta \pm 5$ deg. corrected to read Theta (θ) ± 5 deg.</i>
	Fig. 8	<i>$\theta \pm 5$ deg. corrected to read Theta (θ) ± 5 deg.</i>
	4.14	<i>First sentence corrected to read The wrench shall have two open ends inclined from the wrench handle.</i>

Page	Location	Change
5, 6	5.2.2	<i>Fourth sentence corrected to read Mandrels shall be hardened to show a hardness of not less than 55 HRC and smoothly finished on the wrench engaging surfaces.</i>
	5.2.3.1	<i>In the fifth line, gauge corrected to read gage</i>
8	Table 2	<i>In sixth main column (Height to Where Offset Blends With Handle), under column E, Small Head, Max. corrected to read Min.</i>
17	Table 10B	<i>Title corrected to read Type VI, Style 1, Angle Wrench, Double Head, Open End, 15 deg. and 60 deg.</i>

CONTENTS

Foreword	iii
Standards Committee Roster	v
1 Scope	1
2 Classification	1
3 Applicable Standards	1
4 Requirements	1
4.1 Illustrations	1
4.2 Materials	1
4.3 Markings	1
4.4 Hardness	1
4.5 Proof Loads	2
4.6 Wrench Opening	2
4.7 Finish	2
4.8 Design	2
4.9 Type I, Box Wrench, Double Head	2
4.10 Type II, Engineer's Wrench, Double Head, Open End 15 deg.	2
4.11 Type III, Combination Wrench, Open End, and 15 deg., Offset Box Openings	2
4.12 Type IV, Flare Nut Wrench, Double Head	4
4.13 Type V, Flare Nut Combination Wrench, Open End, and 15 deg. Offset Box Openings	4
4.14 Type VI, Angle Wrench, Double Head, Open End	4
4.15 Type VII, Tappet Wrench, Open End	4
4.16 Workmanship	4
5 Test Procedures	5
5.1 Hardness	5
5.2 Proof Test	5
6 Designations	6

Figures

1 Finish Requirements	3
2A Type I, Class 1, Style 1 Box Wrench, Double Head, 15 deg. Offset Each End, Regular Length	3
2B Type I, Class 1, Style 1 Box Wrench, Double Head, 15 deg. Offset Each End, Regular Length	3
3 Type I, Class 2, Style 1 and 2 Box Wrench, Double End, Deep Offset Each End, Regular and Short Lengths	3
4 Type I, Class 2, Style 1 and 2 Box Wrench, Modified Offset, Regular and Short Lengths	3
5 Type II, Engineer's Wrench, Double Head, Open End, 15 deg.	4

6	Type III, Style 1, 2, and 3 Combination Wrench, Open End, and 15 deg. Offset Box Opening	4
7	Type IV, Flare Nut Wrench, Double Head	4
8	Type V, Flare Nut Combination Wrench, Open End, and 15 deg. Offset Box Opening.....	4
9	Type VI, Style 1, Angle Wrench, Double Head, Open End, 15 deg. and 60 deg. Heads	5
10	Type VI, Style 2, Angle Wrench, Double Head, Open End, 30 deg. and 60 deg. Heads	5
11	Type VII, Class 1, Tappet Wrench, Double Head, Open End 15 deg. Head	5

Tables

1	Type I, Class 1, Style 1, Box Wrench, Double Head, 15 deg. Offset Each End, Regular Length	7
2	Type I, Class 2, Style 1, Box Wrench, Double Head, Deep Offset Each End, Regular Length	8
3	Type I, Class 2, Style 2, Box Wrench, Double Head, Deep Offset Each End, Short Length	9
4	Type I, Class 2, Style 1, Box Wrench, Double Head, Modified Offset, Regular Length	10
5	Type I, Class 2, Style 2, Box Wrench, Double Head, Modified Offset, Each End, Short Length	11
6	Type II, Engineer's Wrench, Double Head, Open End, 15 deg.	12
7A	Type III, Style 1, Combination Wrench, Open End and 15 deg. Offset Box Opening, Regular Length	13
7B	Type III, Style 2, Combination Wrench, Open End, 15 deg. Offset Box Opening, Short Length	14
7C	Type III, Style 3, Combination Wrench, Open End, 15 deg. Offset Box Opening, Long Length	15
8	Type IV, Flare Nut Wrench, Double Head	16
9	Type V, Flare Nut Combination Wrench, Open End, and 15 deg. Offset Box Opening	16
10A	Type VI, Style 1 and 2, Angle Wrench, Double Head, Open End	17
10B	Type VI, Style 1, Angle Wrench, Double Head, Open End, 15 deg. and 60 deg.	17
11	Type VII, Class 1, Tappet Wrench, Double Head, Open End, 15 deg.	18
12	Hexagon Mandrel Dimensions (Metric)	19

WRENCHES, BOX, ANGLED, OPEN END, COMBINATION, FLARE NUT, AND TAPPET (METRIC 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

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.

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

Type VII Tappet Wrench, Double Head, Open End.

Class 1 — 15 deg. offset each end

3 APPLICABLE STANDARDS

ASTM E-10-84, Standard Test Method for Brinell Hardness of Metallic Materials

ASTM E-18-93, 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.

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).

ASME B107.9M-1994

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 $\mu\text{in.}$ (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 0.38 mm radius minimum, and shall not project more than 0.38 mm 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 0.0038 mm. The chromium thickness shall be a minimum of 0.000076 mm. 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.

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

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

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 2 and Style 2 shall conform to Table 3.

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

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 Table 6, 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

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

ASME B107.9M-1994

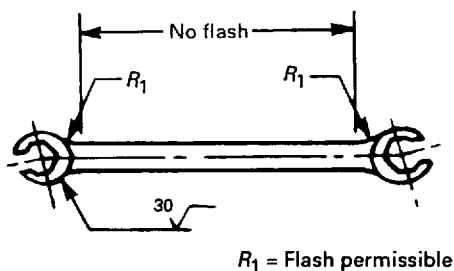
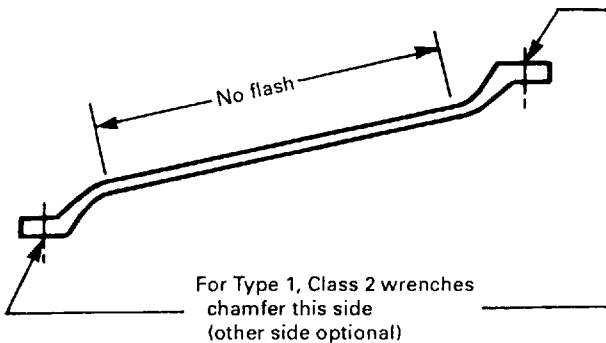
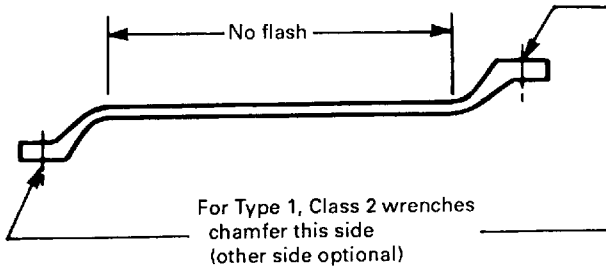
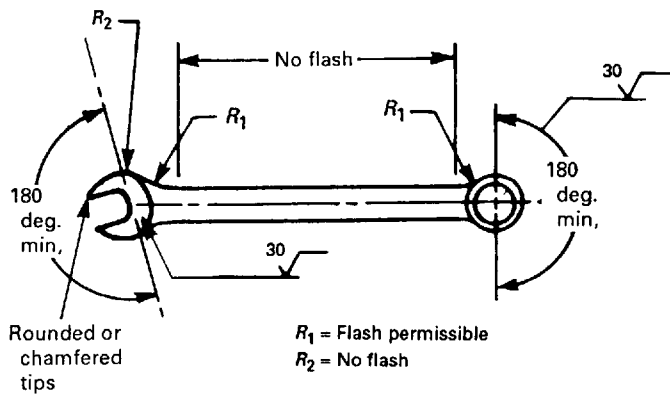


FIG. 1 FINISH REQUIREMENTS

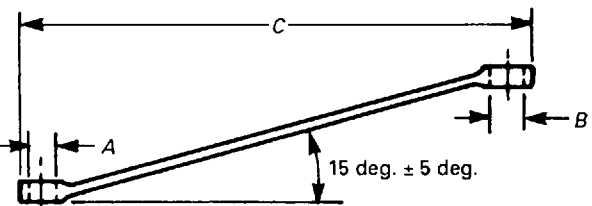


FIG. 2A TYPE I, CLASS 1, STYLE 1 BOX WRENCH, DOUBLE HEAD, 15 deg. OFFSET EACH END, REGULAR LENGTH

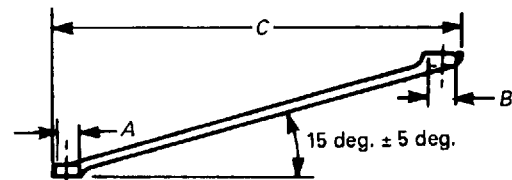


FIG. 2B TYPE I, CLASS 1, STYLE 1 BOX WRENCH, DOUBLE HEAD, 15 deg. OFFSET EACH END, REGULAR LENGTH

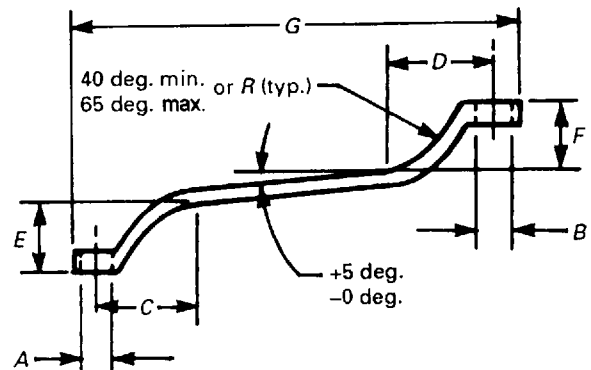


FIG. 3 TYPE I, CLASS 2, STYLE 1 AND 2, BOX WRENCH, DOUBLE HEAD, DEEP OFFSET EACH END, REGULAR AND SHORT LENGTHS

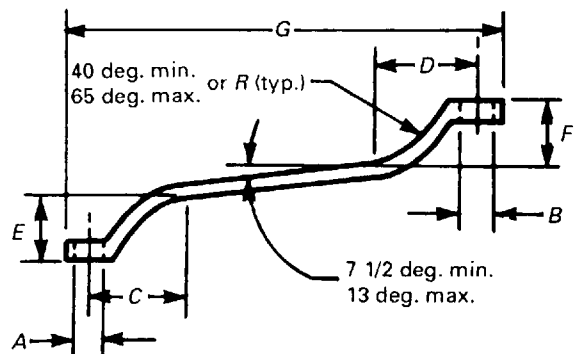


FIG. 4 TYPE I, CLASS 2, STYLE 1 AND 2 BOX WRENCH, MODIFIED OFFSET, REGULAR AND SHORT LENGTHS

ASME B107.9M-1994

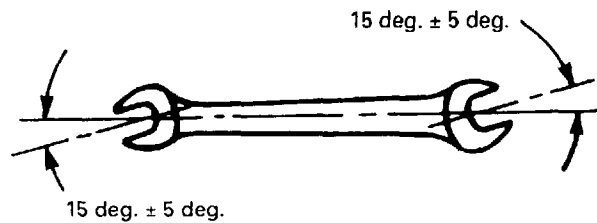


FIG. 5 TYPE II, ENGINEER'S WRENCH, DOUBLE HEAD, OPEN END, 15 deg.

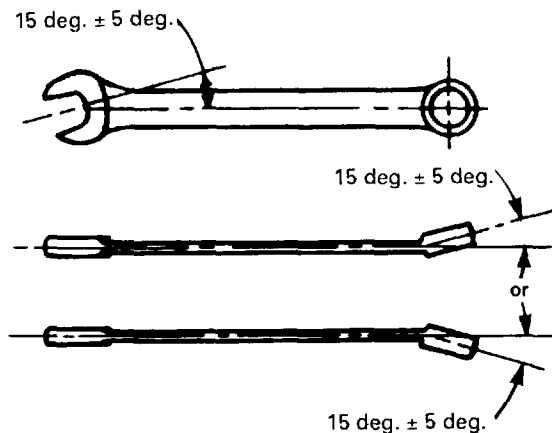


FIG. 6 TYPE III, STYLE 1, 2, AND 3 COMBINATION WRENCH, OPEN END, AND 15 deg. OFFSET BOX OPENING

suitable for hexagon 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 Tables 7A, 7B, and 7C, and shall be similar to Fig. 6.

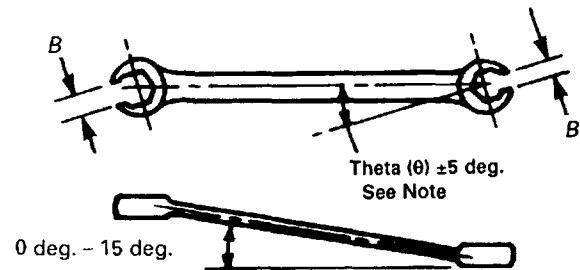
4.12 Type IV Flare Nut Wrench, Double Head

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 8.

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

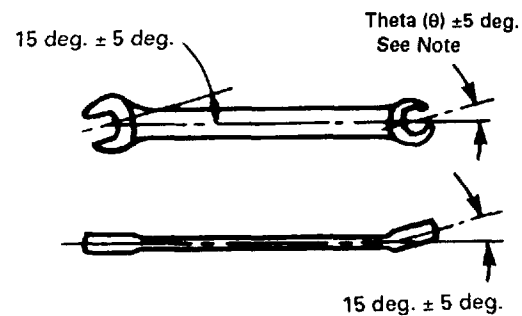
The wrench shall have one open end and one end with a 6 or 12 point (hexagon or double hexagon) box opening of identical nominal size. The wrench shall be suitable for use on hexagonal flare nuts. Wrenches shall conform to Table 9 and shall be similar to Fig. 8.

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



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

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



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

4.14 Type VI Angle Wrench, Double Head, Open End

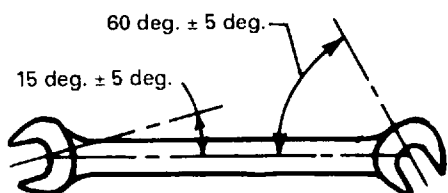
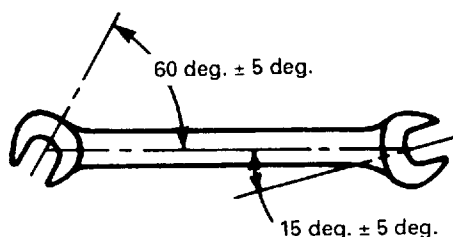
The wrench shall have two open ends inclined from the wrench handle. Style 1 wrenches shall be similar to Fig. 9 and conform to Table 10. Style 2 wrenches shall conform to Table 10 and be similar to Fig. 10.

4.15 Type VII, Tappet Wrench, Open End

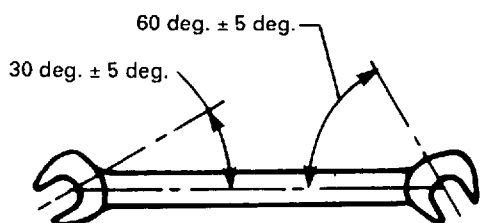
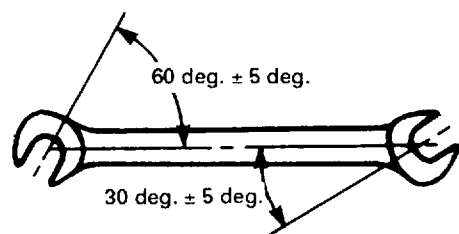
The wrench shall be suitable for hexagonal and square-headed bolts and nuts. The Class 1 double spearhead wrench shall conform to Table 11 and be similar to Fig. 11.

4.16 Workmanship

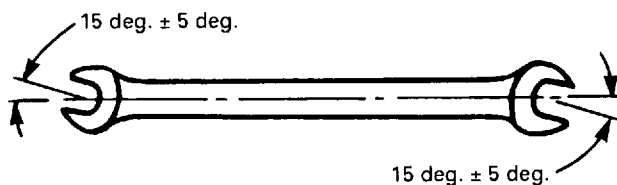
The requirements within this Standard are intended to describe the best commercial quality wrenches



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



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



**FIG. 11 TYPE VII, CLASS 1, TAPPET WRENCH
DOUBLE HEAD, OPEN END, 15 deg. HEAD**

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-18-93. When surface preparation is necessary the amount of material removed shall not exceed .1778 mm 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 12. 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. Box ends shall be loaded to the proof load. Following the removal of the proof

ASME B107.9M-1994

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 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:

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

0.05 mm for wrench sizes 4 mm through 25 mm
0.08 mm for wrench sizes 26 mm through 50 mm

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 10 × 11 double hex openings.

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

ASME B107.9M-1994

**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		Thickness of Wrench Heads			Overall Length			Proof Load <i>N-M</i>		
A		B	A		B	Large Head	of Diameter		A		B	C			A		B
Small Head	mm	Large Head	Small Head		Max.		mm	Max.	mm	Max.	mm				Min.	mm	Max.
			Max.	mm								Max.	mm	Max.			
6	8		12.7	15.0	0.38	7.4	7.7	7.7	173	193	20	30					
7	9		14.3	17.4	0.38	7.7	8.5	7.7	190	220	27	40					
8	9		15.0	17.4	0.38	7.7	8.5	7.7	176	192	30	40					
10	11		18.8	19.9	0.38	9.0	10.0	9.0	192	223	71	80					
12	13		21.0	23.1	0.46	9.8	10.5	9.8	211	232	91	115					
12	14		21.0	24.4	0.46	9.8	11.5	9.8	217	245	91	158					
13	15		23.1	26.0	0.46	10.5	11.5	10.5	239	259	115	200					
14	15		24.4	26.0	0.46	10.1	11.5	10.1	223	251	158	200					
16	17		27.0	29.3	0.46	12.1	12.6	12.1	241	280	248	267					
16	18		27.0	29.3	0.46	12.1	12.6	12.1	261	281	248	304					
16	19		27.0	31.2	0.46	12.1	14.8	12.1	259	292	248	323					
17	19		29.3	31.2	0.46	12.6	14.8	12.6	259	300	267	323					
20	22		31.8	35.6	0.51	14.8	16.3	14.8	296	356	347	408					
21	23		33.8	37.3	0.51	16.3	16.5	16.3	307	356	372	455					
22	24		35.6	38.1	0.51	16.3	16.5	16.3	317	376	408	509					
24	26		38.1	42.2	0.51	16.5	18.0	16.5	337	396	509	608					
25	28		40.2	45.3	0.51	17.9	19.8	17.9	370	458	559	710					
27	30		44.2	47.5	0.58	19.8	20.0	19.8	380	458	671	795					
28	32		45.3	49.8	0.58	19.8	21.5	19.8	396	458	710	905					
30	32		47.5	49.8	0.58	20.0	21.5	20.0	396	458	795	905					

ASME B107.9M-1994

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

TABLE 2 TYPE I, CLASS 2, STYLE 1, BOX WRENCH, DOUBLE HEAD, DEEP 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		Center Line of Wrench Opening to Point Where Offset Blends With Handle		Height to Where Offset Blends With Handle		Overall Length		Proof Load <i>N-M</i>	
A	B	A	B	Max.	mm	A	B	C	D	E	F	Min.	mm	A	B
Small Head	Large Head	Small Head	Large Head	Max.	mm	Small Head	Large Head	Small Head	Large Head	Small Head	Large Head	Min.	mm	Small Head	Large Head
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Nm	Nm
6	7	12.7	14.3	0.38	6.5	6.5	8.5	16.3	17.9	9.1	9.1	144	20	20	27
8	9	15.0	17.4	0.38	7.8	7.8	9.2	19.0	21.9	7.9	7.9	158	30	30	40
9	11	17.4	19.9	0.38	9.0	9.0	9.2	19.6	21.9	9.1	9.1	170	40	40	80
10	11	18.8	19.9	0.38	9.0	9.0	9.2	22.1	24.6	9.1	9.1	177	71	71	80
12	13	21.4	23.1	0.38	10.0	10.0	10.5	26.6	30.6	11.9	12.7	203	91	91	115
12	14	21.4	24.4	0.38	10.0	10.0	11.5	26.6	30.6	11.9	12.4	208	91	91	158
13	14	23.1	24.4	0.38	10.5	10.5	11.5	26.6	30.6	12.7	12.4	219	115	115	158
13	15	23.1	26.0	0.46	10.5	10.5	11.5	26.6	33.4	12.7	12.4	230	115	115	200
14	15	24.4	26.0	0.46	11.5	11.5	11.5	30.6	33.5	12.7	13.2	230	158	158	200
15	17	26.0	29.3	0.46	11.5	11.5	12.6	30.6	33.4	12.7	13.2	233	200	200	267
16	17	27.0	29.3	0.46	12.1	12.1	12.6	32.2	35.8	13.7	14.4	240	248	248	267
16	18	27.0	29.3	0.46	12.1	12.1	12.6	32.2	35.8	13.7	14.4	245	248	248	304
17	19	29.3	31.2	0.46	12.6	12.6	14.8	35.8	38.5	13.7	14.4	268	267	267	323
18	19	29.3	31.2	0.46	12.6	12.6	14.8	37.0	38.5	17.7	18.0	280	304	304	323
19	20	31.2	31.8	0.46	14.8	14.8	16.3	37.0	38.5	17.7	18.0	280	323	323	347
19	21	31.2	33.8	0.46	14.8	14.8	16.3	41.7	44.2	20.3	21.0	285	323	323	372
20	22	31.8	35.6	0.51	14.8	14.8	16.3	42.5	45.7	20.3	22.0	292	347	347	408
21	23	33.8	37.3	0.51	16.3	16.3	16.3	42.5	45.7	20.3	22.0	307	372	372	455
22	23	35.6	37.3	0.51	16.3	16.3	16.5	42.5	45.7	20.3	22.0	333	408	408	455
22	24	35.6	38.1	0.51	16.3	16.3	16.5	42.5	50.0	20.3	20.6	340	408	408	509
24	26	38.1	42.2	0.51	16.5	16.5	18.0	50.0	52.8	26.8	26.8	354	509	509	608
25	28	40.2	45.3	0.51	17.9	17.9	19.0	52.8	55.6	29.7	29.7	379	559	559	710
26	29	42.2	45.3	0.58	18.0	18.0	19.5	56.0	58.4	32.1	32.1	404	608	608	750
27	32	44.2	49.8	0.58	19.8	19.8	21.5	61.9	63.9	37.5	37.5	430	671	671	905

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

ASME B107.9M-1994

**TABLE 10A TYPE VI, STYLE 1 AND 2, ANGLE WRENCH,
DOUBLE HEAD, OPEN END**

Wrench Opening Across Flats	Width of Open Head	Thickness of Heads	Overall Length	Proof Load <i>N-M</i>
	Max.	Max.	Max.	Min.
mm	mm	mm	mm	Nm
9	20.1	5.6	130	4
10	21.8	6.2	135	4
11	23.7	6.3	142	8
12	25.5	6.7	150	12
13	27.5	6.8	160	15
14	30.3	7.2	170	18
15	31.5	7.4	180	18
16	34.1	7.7	190	23
17	36.0	7.8	200	34
18	38.0	8.0	210	50
19	39.5	8.2	220	57
21	43.5	8.6	236	95
22	45.5	8.8	247	119
24	49.5	9.2	262	174
27	55.5	9.8	291	280

**TABLE 10B TYPE VI, STYLE 1, ANGLE WRENCH, DOUBLE HEAD, OPEN
END, 15 deg. AND 60 deg.**

Wrench Opening Across Flats		Width of Heads		Head Thickness	Overall Length	Proof Load <i>N-M</i>	
<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>	<i>A</i>		15 deg. Head	60 deg. Head
15 deg. Head	60 deg. Head	15 deg. Head	60 deg. Head	Both Heads	Min.	Min.	Min.
mm	mm	mm	mm	mm	mm	Nm	Nm
3.2	5.5	8.91	12.70	3.37	74.70	0.90	4.51
5.5	3.2	12.70	8.91	3.37	83.90	4.51	0.90
4	5	9.80	11.17	3.24	78.00	1.80	3.50
5	4	11.17	9.80	3.24	81.80	3.50	1.80
6	7	13.97	16.25	3.57	85.90	5.87	9.03
7	6	16.25	13.97	3.57	90.00	9.03	5.87
8	9	19.25	21.08	3.73	94.00	13.21	18.30
9	8	21.08	19.25	3.73	97.90	18.30	13.21
10	11	22.68	24.86	4.03	101.90	24.73	32.19
11	10	24.86	22.68	4.03	106.00	32.19	24.73

ASME B107.9M-1994

WRENCHES, BOX, ANGLED, OPEN END, COMBINATION,
FLARE NUT, AND TAPPET (METRIC SERIES)**TABLE 11 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 <i>N-M</i>	
<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>	<i>A</i>		Small Head	Large Head
Small Head	Large Head	Small Head	Large Head	Both Heads			
		Max.	Max.	Max.	Min.	Min.	Min.
mm	mm	mm	mm	mm	mm	Nm	Nm
6	7	16.4	18.4	4.0	114	4	6
8	9	20.4	21.9	4.2	120	9	13
8	10	20.4	24.4	4.4	125	9	17
10	11	24.4	26.4	4.5	136	17	21
12	13	28.4	30.4	4.7	142	26	32
12	14	28.4	32.4	4.7	147	26	38
13	15	30.4	34.4	4.8	152	32	46
14	15	32.4	34.4	4.8	150	38	46
16	18	36.6	41.0	5.0	169	53	71
17	19	38.8	43.2	5.1	174	62	81
19	22	43.2	48.3	5.6	185	81	116
21	24	46.3	52.3	6.0	196	103	143
27	30	56.0	62.0	7.1	310	187	238

ASME B107.9M-1994

(REVISION OF ANSI B107.9-1978)

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

AN AMERICAN NATIONAL STANDARD



The American Society of
Mechanical Engineers

AN AMERICAN NATIONAL STANDARD

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

ASME B107.9M-1994

(REVISION OF ANSI B107.9-1978)



The American Society of
Mechanical Engineers

345 East 47th Street, New York, N.Y. 10017

Date of Issuance: March 1, 1995

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

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 Consensus 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 which 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 assume 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 issued in accordance with governing ASME procedures and policies which preclude the issuance of interpretations by individual volunteers.

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.

Copyright © 1995 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All Rights Reserved
Printed in U.S.A.

FOREWORD

(This Foreword is not a part of ASME B107.9M-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 November 8, 1978, and designated ANSI B107.9-1978.

The latest edition of this Standard, ASME B107.9M-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.)

OFFICERS

R. R. McCullough, *Chairman*
R. M. Byrne, *Vice Chairman*
C. J. Gomez, *Secretary*

COMMITTEE PERSONNEL

R. M. Byrne, Trade Association Management Inc.
A. Carr, General Services Administration, Federal Supply Service
E. L. Harcourt, Chicago Pneumatic Tool Company
A. Herskovitz, U.S. Department of the Army
R. R. McCullough, Utica Tool Company
W. R. Wacker, BAC Associates, Inc.
R. B. Wright, Wright Tool Company

CONTENTS

Foreword	iii
Standards Committee Roster	v
1 Scope	1
2 Classification	1
3 Applicable Standards	1
4 Requirements	1
4.1 Illustrations	1
4.2 Materials	1
4.3 Markings	1
4.4 Hardness	1
4.5 Proof Loads	2
4.6 Wrench Opening	2
4.7 Finish	2
4.8 Design	2
4.9 Type I, Box Wrench, Double Head	2
4.10 Type II, Engineer's Wrench, Double Head, Open End 15 deg.	2
4.11 Type III, Combination Wrench, Open End, and 15 deg., Offset Box Openings	2
4.12 Type IV, Flare Nut Wrench, Double Head	4
4.13 Type V, Flare Nut Combination Wrench, Open End, and 15 deg. Offset Box Openings	4
4.14 Type VI, Angle Wrench, Double Head, Open End	4
4.15 Type VII, Tappet Wrench, Open End	4
4.16 Workmanship	4
5 Test Procedures	5
5.1 Hardness	5
5.2 Proof Test	5
6 Designations	6
Figures	
1 Finish Requirements	3
2A Type I, Class 1, Style 1 Box Wrench, Double Head, 15 deg. Offset Each End, Regular Length	3
2B Type I, Class 1, Style 1 Box Wrench, Double Head, 15 deg. Offset Each End, Regular Length	3
3 Type I, Class 2, Style 1 and 2 Box Wrench, Double End, Deep Offset Each End, Regular and Short Lengths	3
4 Type I, Class 2, Style 1 and 2 Box Wrench, Modified Offset, Regular and Short Lengths	3
5 Type II, Engineer's Wrench, Double Head, Open End, 15 deg.	4

6	Type III, Style 1, 2, and 3 Combination Wrench, Open End, and 15 deg. Offset Box Opening	4
7	Type IV, Flare Nut Wrench, Double Head	4
8	Type V, Flare Nut Combination Wrench, Open End, and 15 deg. Offset Box Opening.....	4
9	Type VI, Style 1, Angle Wrench, Double Head, Open End, 15 deg. and 60 deg. Heads	5
10	Type VI, Style 2, Angle Wrench, Double Head, Open End, 30 deg. and 60 deg. Heads	5
11	Type VII, Class 1, Tappet Wrench, Double Head, Open End 15 deg. Head	5

Tables

1	Type I, Class 1, Style 1, Box Wrench, Double Head, 15 deg. Offset Each End, Regular Length	7
2	Type I, Class 2, Style 1, Box Wrench, Double Head, Deep Offset Each End, Regular Length	8
3	Type I, Class 2, Style 2, Box Wrench, Double Head, Deep Offset Each End, Short Length	9
4	Type I, Class 2, Style 1, Box Wrench, Double Head, Modified Offset, Regular Length	10
5	Type I, Class 2, Style 2, Box Wrench, Double Head, Modified Offset, Each End, Short Length	11
6	Type II, Engineer's Wrench, Double Head, Open End, 15 deg.	12
7A	Type III, Style 1, Combination Wrench, Open End and 15 deg. Offset Box Opening, Regular Length	13
7B	Type III, Style 2, Combination Wrench, Open End, 15 deg. Offset Box Opening, Short Length	14
7C	Type III, Style 3, Combination Wrench, Open End, 15 deg. Offset Box Opening, Long Length	15
8	Type IV, Flare Nut Wrench, Double Head	16
9	Type V, Flare Nut Combination Wrench, Open End, and 15 deg. Offset Box Opening	16
10A	Type VI, Style 1 and 2, Angle Wrench, Double Head, Open End	17
10B	Type VI, Class 1, Angle Wrench, Double Head, Open End, 15 deg. and 60 deg.	17
11	Type VII, Class 1, Tappet Wrench, Double Head, Open End, 15 deg.	18
12	Hexagon Mandrel Dimensions (Metric)	19

WRENCHES, BOX, ANGLED, OPEN END, COMBINATION, FLARE NUT, AND TAPPET (METRIC 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

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.

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

Type VII Tappet Wrench, Double Head, Open End.

Class 1 — 15 deg. offset each end

3 APPLICABLE STANDARDS

ASTM E-10-84, Standard Test Method for Brinell Hardness of Metallic Materials

ASTM E-18-93, Rockwell Hardness and Rockwell Superficial Hardness of Materials, Test for
ASME B107.17M, 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.

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).

ASME B107.9M-1994

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 $\mu\text{in.}$ (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 0.38 mm radius minimum, and shall not project more than 0.38 mm 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 0.0038 mm. The chromium thickness shall be a minimum of 0.000076 mm. 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.

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

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 Regular Length. Shall be similar to Fig. 2A or Fig. 2B and conform to Table 1.

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 2 and Style 2 shall conform to Table 3.

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

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 Table 6, 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

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

ASME B107.9M-1994

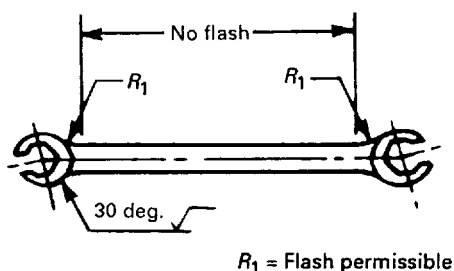
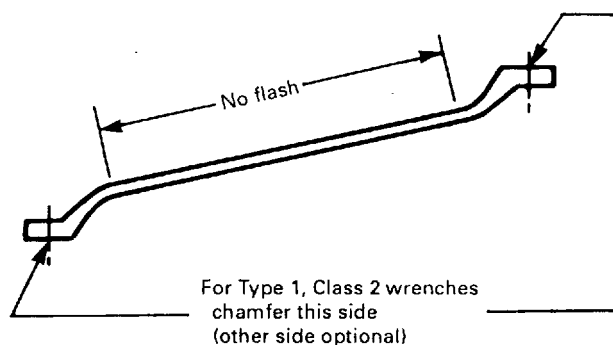
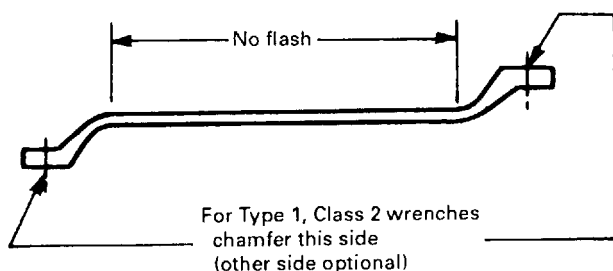
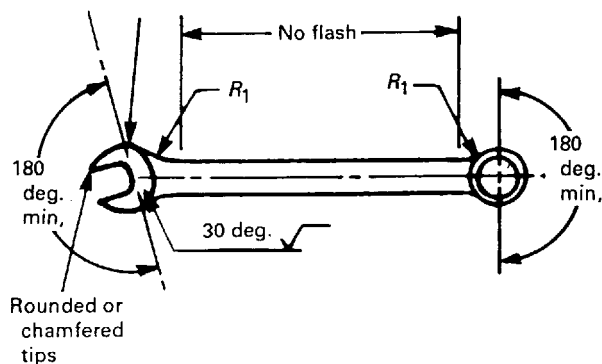


FIG. 1 FINISH REQUIREMENTS

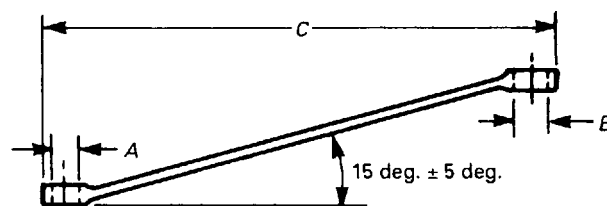


FIG. 2A TYPE I, CLASS 1, STYLE 1 BOX WRENCH, DOUBLE HEAD, 15 deg. OFFSET EACH END, REGULAR LENGTH

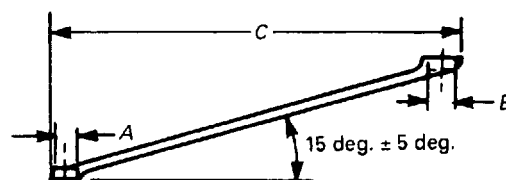


FIG. 2B TYPE I, CLASS 1, STYLE 1 BOX WRENCH, DOUBLE HEAD, 15 deg. OFFSET EACH END, REGULAR LENGTH

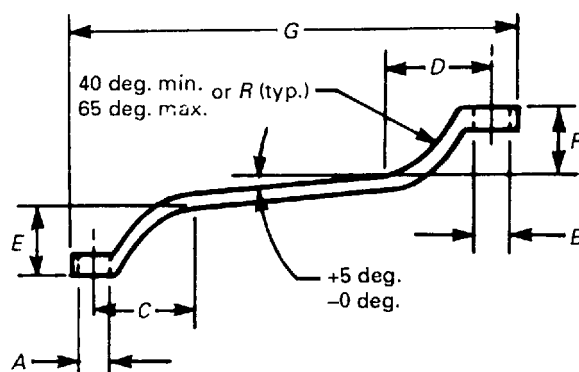


FIG. 3 TYPE I, CLASS 2, STYLE 1 AND 2, BOX WRENCH, DOUBLE HEAD, DEEP OFFSET EACH END, REGULAR AND SHORT LENGTHS

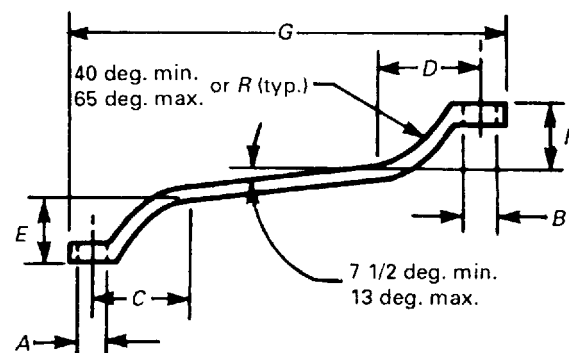


FIG. 4 TYPE I, CLASS 2, STYLE 1 AND 2 BOX WRENCH, MODIFIED OFFSET, REGULAR AND SHORT LENGTHS

ASME B107.9M-1994

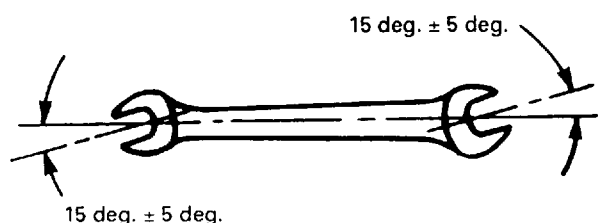


FIG. 5 TYPE II, ENGINEER'S WRENCH, DOUBLE HEAD, OPEN END, 15 deg.

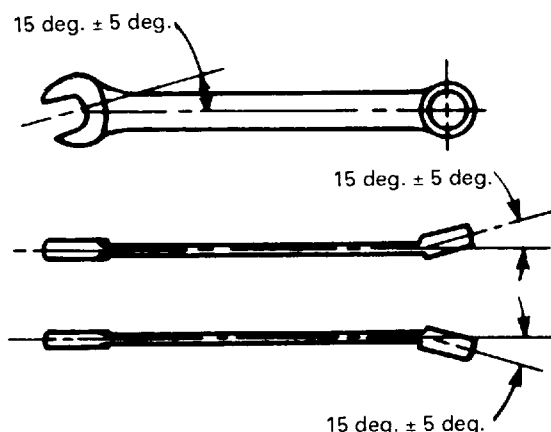


FIG. 6 TYPE III, STYLE 1, 2, AND 3 COMBINATION WRENCH, OPEN END, AND 15 deg. OFFSET BOX OPENING

suitable for hexagon 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 Tables 7A, 7B, and 7C, and shall be similar to Fig. 6.

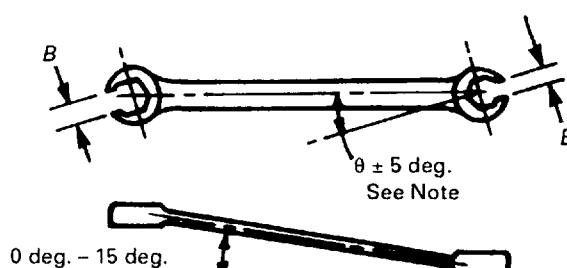
4.12 Type IV Flare Nut Wrench, Double Head

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 8.

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

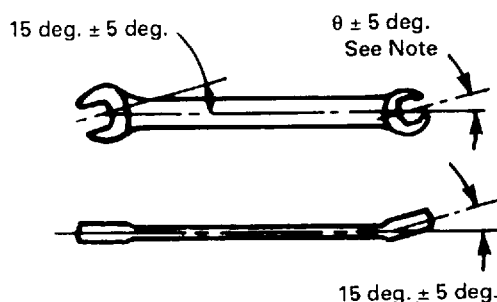
The wrench shall have one open end and one end with a 6 or 12 point (hexagon or double hexagon) box opening of identical nominal size. The wrench shall be suitable for use on hexagonal flare nuts. Wrenches shall conform to Table 9 and shall be similar to Fig. 8.

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



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

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



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

4.14 Type VI Angle Wrench, Double Head, Open End

The wrench shall have two open ends of identical nominal size inclined from the wrench handle. Style 1 wrenches shall be similar to Fig. 9 and conform to Table 10. Style 2 wrenches shall conform to Table 10 and be similar to Fig. 10.

4.15 Type VII, Tappet Wrench, Open End

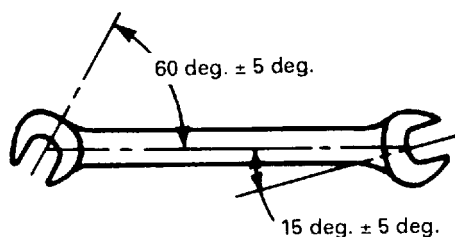
The wrench shall be suitable for hexagonal and square-headed bolts and nuts. The Class 1 double spearhead wrench shall conform to Table 11 and be similar to Fig. 11.

4.16 Workmanship

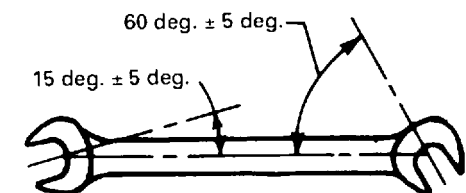
The requirements within this Standard are intended to describe the best commercial quality wrenches

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

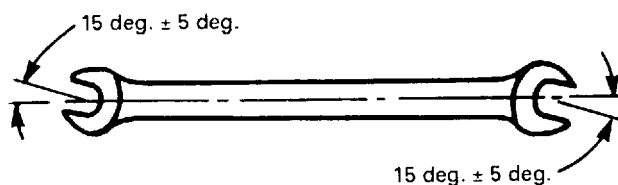
ASME B107.9M-1994



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



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



**FIG. 11 TYPE VII, CLASS 1, TAPPET WRENCH
DOUBLE HEAD, OPEN END, 15 deg. HEAD**

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-18-93. When surface preparation is necessary the amount of material removed shall not exceed .1778 mm 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 12. Mandrels shall be hardened to show a Rockwell hardness of not less than C55 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. Box ends shall be loaded to the proof load. Following the removal of the proof

ASME B107.9M-1994

load, they shall be regaged. Any box end which does not sustain the test load, cracks, fractures, slips on mandrel, or does not gauge 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 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:

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

0.05 mm for wrench sizes 4 mm through 25 mm
0.08 mm for wrench sizes 26 mm through 50 mm

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 10 × 11 double hex openings.

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

ASME B107.9M-1994

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 <i>N-M</i>	
A	B	A	B		A	B				A	B
Small Head	Large Head	Small Head	Large Head	Max.	Small Head	Large Head	Max.	Min.	Max.	Min.	Max.
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Nm	Nm
6	8	12.7	15.0	0.38	7.4	7.7	7.7	173	193	20	30
7	9	14.3	17.4	0.38	7.7	8.5	8.5	190	220	27	40
8	9	15.0	17.4	0.38	7.7	8.5	8.5	176	192	30	40
10	11	18.8	19.9	0.38	9.0	10.0	10.0	192	223	71	80
12	13	21.0	23.1	0.46	9.8	10.5	10.5	211	232	91	115
12	14	21.0	24.4	0.46	9.8	11.5	11.5	217	245	91	158
13	15	23.1	26.0	0.46	10.5	11.5	11.5	239	259	115	200
14	15	24.4	26.0	0.46	10.1	11.5	11.5	223	251	158	200
16	17	27.0	29.3	0.46	12.1	12.6	12.6	241	280	248	267
16	18	27.0	29.3	0.46	12.1	12.6	12.6	261	281	248	304
16	19	27.0	31.2	0.46	12.1	14.8	14.8	259	292	248	323
17	19	29.3	31.2	0.46	12.6	14.8	14.8	259	300	267	323
20	22	31.8	35.6	0.51	14.8	16.3	16.3	296	356	347	408
21	23	33.8	37.3	0.51	16.3	16.5	16.5	307	356	372	455
22	24	35.6	38.1	0.51	16.3	16.5	16.5	317	376	408	509
24	26	38.1	42.2	0.51	16.5	18.0	18.0	337	396	509	608
25	28	40.2	45.3	0.51	17.9	19.8	19.8	370	458	559	710
27	30	44.2	47.5	0.58	19.8	20.0	20.0	380	458	671	795
28	32	45.3	49.8	0.58	19.8	21.5	21.5	396	458	710	905
30	32	47.5	49.8	0.58	20.0	21.5	21.5	396	458	795	905

ASME B107.9M-1994

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

TABLE 2 TYPE I, CLASS 2, STYLE 1, BOX WRENCH, DOUBLE HEAD, DEEP 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		Center Line of Wrench Opening to Point Where Offset Blends With Handle		Height to Where Offset Blends With Handle		Overall Length	Proof Load $N-M$	
A	B	A	B	Max.	A	B	C	D	E	F	Min.	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
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
6	7	12.7	14.3	0.38	6.5	6.5	16.3	17.9	9.1	9.1	144	20	27
8	9	15.0	17.4	0.38	7.8	8.5	19.0	21.9	7.9	7.9	158	30	40
9	11	17.4	19.9	0.38	9.0	9.2	19.6	21.9	9.1	9.1	170	40	80
10	11	18.8	19.9	0.38	9.0	9.2	22.1	24.6	9.1	9.1	177	71	80
12	13	21.4	23.1	0.38	10.0	10.5	26.6	30.6	11.9	12.7	203	91	115
12	14	21.4	24.4	0.38	10.0	11.5	26.6	30.6	11.9	12.4	208	91	158
13	14	23.1	24.4	0.38	10.5	11.5	26.6	30.6	12.7	12.4	219	115	158
13	15	23.1	26.0	0.46	10.5	11.5	26.6	33.4	12.7	12.4	230	115	200
14	15	24.4	26.0	0.46	11.5	11.5	30.6	33.5	12.7	13.2	230	158	200
15	17	26.0	29.3	0.46	11.5	12.6	30.6	33.4	12.7	13.2	233	200	267
16	17	27.0	29.3	0.46	12.1	12.6	32.2	35.8	13.7	14.4	240	248	267
16	18	27.0	29.3	0.46	12.1	12.6	32.2	35.8	13.7	14.4	245	248	304
17	19	29.3	31.2	0.46	12.6	14.8	35.8	38.5	13.7	14.4	268	267	323
18	19	29.3	31.2	0.46	12.6	14.8	37.0	38.5	17.7	18.0	280	304	323
19	20	31.2	31.8	0.46	14.8	14.8	37.0	38.5	17.7	18.0	280	323	347
19	21	31.2	33.8	0.46	14.8	16.3	41.7	44.2	20.3	21.0	285	323	372
20	22	31.8	35.6	0.51	14.8	16.3	42.5	45.7	20.3	22.0	292	347	408
21	23	33.8	37.3	0.51	16.3	16.3	42.5	45.7	20.3	22.0	307	372	455
22	23	35.6	37.3	0.51	16.3	16.3	42.5	45.7	20.3	22.0	333	408	455
22	24	35.6	38.1	0.51	16.3	16.5	42.5	50.0	20.3	20.6	340	408	509
24	26	38.1	42.2	0.51	16.5	18.0	50.0	52.8	26.8	26.8	354	509	608
25	28	40.2	45.3	0.51	17.9	19.0	52.8	55.6	29.7	29.7	379	559	710
26	29	42.2	45.3	0.58	18.0	19.5	56.0	58.4	32.1	32.1	404	608	750
27	32	44.2	49.8	0.58	19.8	21.5	61.9	63.9	37.5	37.5	430	671	905

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

ASME B107.9M-1994

TABLE 3 TYPE 1, 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 Wrench Opening Where Offset Blends With Handle		Height to Where Offset Blends With Handle		Overall Length		Proof Load <i>N-M</i>	
			A	B		A	B	C	D	E	F	Min.	Max.	A	B
Small Head	Large Head	mm	mm	mm		mm	Small Head	Large Head	Small Head	Large Head	Small Head	Large Head	Min.	Max.	Small Head
mm	mm	mm	mm	mm	Max.	Max.	Max.	Max.	Max.	Min.	Min.	mm	mm	Min.	Min.
6	7	12.7	14.3	0.38	6.5	7.3	20.3	21.6	5.0	5.7	102	114	20	27	
8	9	15.0	17.4	0.38	7.7	8.1	21.6	22.9	5.1	7.0	108	121	30	40	
9	10	17.4	18.8	0.38	8.1	8.9	22.9	24.1	7.0	7.6	114	127	40	71	
10	11	18.8	19.9	0.38	8.9	8.9	22.1	24.6	9.5	10.5	123	133	71	80	
11	12	19.9	21.4	0.38	8.9	9.8	29.6	26.7	8.3	8.9	121	133	80	91	
12	13	21.4	23.1	0.38	9.8	9.9	26.6	30.6	11.3	11.8	135	143	91	115	
13	14	23.1	24.4	0.38	9.9	10.8	27.9	29.2	9.5	10.2	133	146	115	158	
14	15	24.4	26.0	0.46	10.8	11.3	29.2	30.5	10.2	10.8	140	152	158	200	
15	16	26.0	27.0	0.46	11.3	12.1	30.5	31.7	10.8	11.4	142	158	200	248	
16	17	27.0	29.3	0.46	11.3	12.6	26.5	28.7	10.8	11.4	148	159	200	267	
17	18	29.3	31.2	0.46	12.1	12.6	32.2	35.8	17.8	17.8	149	159	248	267	
18	19	29.3	31.2	0.46	12.6	14.1	33.0	35.6	12.1	13.3	159	171	267	323	
19	20	29.3	31.8	0.46	12.6	14.1	37.0	38.5	15.1	17.4	159	169	304	323	
20		29.3		0.46	12.6	14.1	37.0	38.5	12.7	14.0	159	178	304	347	

ASME B107.9M-1994

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

TABLE 4 TYPE I, CLASS 2, STYLE 1, BOX WRENCH, DOUBLE HEAD, MODIFIED OFFSET, REGULAR LENGTH

Wrench Opening Across Flats		Outside Diameter of Heads		Permitted Eccentricity of Wrench Openings to Outside Diameter	Thickness of Wrench Heads		Center Line of Wrench Opening to Point Where Offset Blends With Handle		Height to Where Offset Blends With Handle		Overall Length	Proof Load $N-M$	
A	B	A	B	Max.	A	B	C	D	E	F	Min.	A	B
Small Head	Large Head	Small Head	Large Head	Max.	Small Head	Large Head	Small Head	Large Head	Small Head	Large Head	Min.	Small Head	Large Head
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Nm	Nm
6	7	12.7	14.3	0.38	7.4	7.4	16.3	17.9	6.2	7.1	85	20	27
7	8	14.3	15.0	0.38	7.4	7.5	17.9	24.5	7.1	7.9	150	27	30
8	9	15.0	17.4	0.38	7.7	8.5	24.5	28.5	8.7	8.7	155	30	40
8	10	15.0	18.8	0.38	8.2	9.0	24.5	30.5	8.7	8.0	182	30	71
9	11	17.4	19.9	0.38	8.5	10.0	28.5	31.3	8.7	8.0	182	40	80
10	11	18.8	19.9	0.38	9.0	10.0	30.5	31.3	8.0	8.0	182	71	80
10	12	18.8	21.4	0.38	9.0	10.0	31.1	32.0	8.0	9.5	188	71	91
10	13	18.8	23.1	0.38	9.0	10.5	31.8	33.0	8.0	9.5	188	71	115
11	13	19.9	23.1	0.38	10.0	10.5	34.9	36.5	8.0	9.5	197	80	115
12	13	21.4	23.1	0.38	10.0	10.5	33.0	36.5	8.0	9.5	207	91	115
12	14	21.4	24.4	0.38	10.0	11.5	35.6	40.6	8.0	9.5	213	91	158
13	14	23.1	24.4	0.38	10.5	11.5	40.7	41.6	9.5	9.5	216	115	158
13	15	23.1	26.0	0.38	10.5	11.5	41.3	42.2	9.5	11.0	220	115	200
14	15	24.4	26.0	0.46	11.5	12.6	41.6	42.2	11.0	11.0	225	158	200
15	17	26.0	29.3	0.46	11.5	12.6	42.2	48.3	11.0	12.7	231	200	267
15	18	26.0	29.3	0.46	11.5	12.6	42.2	53.3	11.0	12.7	236	200	304
16	17	27.0	29.3	0.46	12.1	12.6	52.1	54.0	12.7	12.7	241	248	267
16	18	27.0	29.3	0.46	12.1	12.6	52.1	56.3	12.7	12.7	244	248	304
17	19	29.3	31.2	0.46	12.6	14.8	54.0	55.9	12.7	12.7	249	267	323
18	19	29.3	31.2	0.46	12.6	14.8	56.3	57.8	12.7	12.7	254	304	323
18	21	29.3	33.8	0.46	12.6	16.3	56.9	62.9	12.7	16.3	266	304	372
19	20	31.2	31.8	0.46	14.8	14.5	57.8	63.2	12.7	16.3	279	323	347
19	22	31.2	35.6	0.46	14.8	16.3	57.8	64.0	12.7	16.6	285	323	408
20	22	31.8	35.6	0.46	14.8	16.3	60.3	64.0	16.2	16.6	288	347	408
21	22	33.8	35.6	0.51	16.3	16.3	62.9	64.0	16.2	16.6	292	372	408
21	23	33.8	37.3	0.51	16.3	16.5	63.2	66.0	16.2	16.6	300	372	455
21	24	33.8	38.1	0.51	16.3	16.5	63.5	68.6	16.2	17.1	307	372	509
22	24	35.6	38.1	0.51	16.3	16.5	66.0	69.9	16.6	18.3	314	408	509
23	24	37.3	38.1	0.51	16.5	16.5	68.6	70.6	16.6	18.3	322	455	509
24	26	38.1	42.2	0.51	17.8	18.0	70.9	71.8	18.3	18.1	330	509	608
24	27	38.1	44.2	0.51	17.8	19.0	71.6	80.0	18.3	19.4	339	509	671
25	28	40.2	45.3	0.51	17.9	19.0	71.8	83.8	18.6	19.4	350	559	710
26	29	42.2	45.3	0.58	18.0	19.5	75.7	93.7	18.6	20.2	360	608	750
27	30	44.2	47.5	0.58	19.8	20.0	80.0	94.5	19.4	22.2	369	671	795
27	32	44.2	49.8	0.58	19.8	21.5	88.9	95.3	19.4	21.8	381	795	905
30	32	47.5	49.8	0.58	20.0	21.5	94.5	96.8	22.2	21.8	393	795	905

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

ASME B107.9M-1994

TABLE 5 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 Wrench Opening Where Offset Blends With Handle		Height to Where Offset Blends With Handle		Overall Length		Proof Load <i>N-M</i>	
A	B	A	B	Max.	A	B	C	D	E	F	G	Max.	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
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Nm
6	7	12.7	14.3	0.38	6.5	6.5	16.0	20.0	4.5	5.0	84	100	20	27
8	9	15.0	17.4	0.38	7.7	8.5	25.0	30.0	6.0	7.1	100	110	30	40
9	10	17.4	18.8	0.38	8.5	9.0	30.0	30.2	7.1	7.3	110	120	40	71
10	11	18.8	19.9	0.38	9.0	10.0	30.2	35.3	7.3	7.6	110	125	71	80
11	12	19.9	21.4	0.38	10.0	10.0	30.2	35.3	7.3	7.6	120	130	80	91
12	13	21.4	23.1	0.38	10.0	10.5	34.9	36.5	7.5	7.5	135	145	91	115
14	15	24.4	26.0	0.46	11.5	11.5	36.5	38.1	9.8	11.4	160	160	158	200

ASME B107.9M-1994

WRENCHES, BOX, ANGLED, OPEN END, COMBINATION,
FLARE NUT, AND TAPPET (METRIC SERIES)**TABLE 6 TYPE II, ENGINEER'S WRENCH, DOUBLE HEAD,
OPEN END, 15 deg.**

Wrench Opening Across Flats		Overall Length	Width of Heads		Thickness of Wrench Heads		Proof Loads <i>N-M</i>	
<i>A</i>	<i>B</i>		<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>	Small Head	Large Head
Small Head	Large Head		Small Head	Large Head	Small Head	Large Head		
		Min.	Max.	Max.	Max.	Max.	Min.	Min.
mm	mm	mm	mm	mm	mm	mm	Nm	Nm
6	7	90	17.3	17.3	5.1	5.1	7	8
6	8	100	17.3	21.4	5.8	5.8	7	15
7	8	100	17.3	21.4	6.3	6.3	8	15
7	9	100	17.3	21.4	6.3	6.3	8	21
8	9	100	21.4	21.4	6.0	6.0	15	21
8	10	100	21.4	26.0	6.0	6.0	15	31
9	10	105	21.4	26.0	6.0	6.0	21	31
9	11	112	21.4	26.0	6.6	6.6	21	46
10	11	112	26.0	26.0	6.9	6.9	31	46
11	13	130	26.0	30.2	7.0	7.0	46	62
12	13	140	27.7	30.2	7.2	7.2	49	62
12	14	150	27.7	32.8	8.0	8.0	49	86
13	15	155	30.2	34.8	8.9	8.9	62	104
14	15	155	32.8	34.8	8.0	8.0	86	104
14	16	155	32.8	36.4	8.0	8.0	86	124
15	17	170	34.8	39.7	8.0	8.0	104	139
15	18	170	34.8	39.7	8.2	8.2	104	155
16	17	170	36.4	39.7	8.7	8.7	124	139
16	18	170	36.4	39.7	9.4	9.4	124	155
17	19	185	39.7	42.7	9.8	9.8	139	186
18	19	200	39.7	42.7	9.8	9.8	155	186
18	21	200	39.7	46.3	10.0	10.0	155	248
19	22	205	42.7	47.8	10.1	10.0	186	279
20	21	205	44.2	46.3	10.1	10.1	217	248
20	22	205	44.2	47.8	10.4	10.4	217	279
21	22	225	46.3	47.8	10.6	10.6	248	279
21	23	225	46.3	50.3	11.3	11.3	248	310
21	24	250	46.3	52.4	10.6	10.6	248	341
22	24	250	47.8	52.4	11.4	11.4	279	341
24	26	250	52.4	57.2	11.9	11.9	341	403
24	27	280	52.4	60.2	12.2	12.2	341	432
25	27	280	53.6	60.2	12.2	12.2	372	432
25	28	280	53.6	61.8	12.7	12.7	372	497
27	29	305	60.2	61.8	13.7	13.7	432	514
27	30	317	60.2	65.8	14.2	14.2	432	570
27	32	317	60.2	70.0	14.7	14.7	432	650
28	30	317	61.8	65.8	14.2	14.2	497	570
30	32	335	65.8	70.0	14.7	14.7	570	650
32	36	398	70.0	76.3	15.7	15.7	650	894
36	41	429	76.3	87.4	15.7	15.7	894	1154

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

ASME B107.9M-1994

**TABLE 7A TYPE III, STYLE 1, COMBINATION WRENCH, OPEN END, 15 deg. OFFSET BOX
OPENING, REGULAR LENGTH**

Wrench Opening Across Flats	Width of Open Head	Outside Diameter of Box	Permitted Eccentricity of Wrench Openings to Outside Diameter	Thickness of Wrench Heads		Overall Length		Proof Load <i>N-M</i>	
				Open Head	Box Head			Open Head	Box Head
	Max.	Max.	Max.	Max.	Max.	Min.	Max.	Min.	Min.
mm	mm	mm	mm	mm	mm	mm	mm	Nm	Nm
5.5	15.5	11.8	0.38	5.3	6.0	70	130	5	18
6	17.3	12.7	0.38	5.6	7.4	76	135	7	20
7	17.6	14.3	0.38	5.6	7.4	84	145	8	27
8	21.4	15.0	0.38	5.9	7.5	92	155	15	30
9	21.4	17.4	0.38	6.0	8.5	102	168	21	40
10	24.4	18.8	0.38	6.5	9.0	116	175	31	71
11	26.0	19.9	0.38	6.9	10.0	125	187	46	80
12	27.7	21.4	0.38	7.3	10.0	135	199	49	91
13	30.2	23.1	0.38	7.7	10.5	143	213	62	115
14	32.8	24.4	0.46	8.2	11.5	148	229	86	158
15	34.8	26.0	0.46	8.9	11.5	153	245	104	200
16	36.4	27.0	0.46	8.9	12.1	157	260	124	248
17	39.7	29.3	0.46	9.7	12.6	163	275	139	267
18	41.0	29.3	0.46	9.7	12.6	170	290	155	304
19	42.7	31.2	0.46	10.0	14.8	182	305	186	323
20	44.2	32.9	0.51	10.1	14.8	194	335	217	347
21	47.6	33.8	0.51	10.2	16.3	204	350	248	372
22	48.3	35.6	0.51	10.9	16.3	218	365	279	408
23	51.5	37.3	0.51	11.4	16.5	230	384	310	455
24	53.5	38.1	0.51	11.6	16.5	242	396	341	509
25	55.5	40.2	0.51	12.0	17.5	259	409	372	559
26	57.2	42.2	0.58	12.0	18.0	280	415	403	608
27	60.2	44.2	0.58	12.5	19.0	300	430	432	671
28	62.3	45.3	0.58	13.3	19.0	320	445	497	710
29	65.5	45.3	0.58	13.7	19.5	340	460	514	750
30	67.0	47.5	0.58	14.9	20.0	365	475	570	795
31	68.6	48.6	0.58	14.9	20.5	395	490	610	850
32	71.0	49.8	0.58	14.9	21.5	425	505	650	905
33	73.0	50.3	0.58	15.3	22.3	450	515	700	950
34	75.0	52.0	0.58	16.0	23.2	450	564	745	994
36	76.8	56.1	0.58	18.9	25.1	489	614	894	1165
41	88.8	62.8	0.70	19.3	25.3	579	663	1154	1579
46	95.2	68.0	0.70	22.4	25.8	628	713	1453	2067
50	103.2	76.0	0.70	25.0	27.6	704	762	1716	2512

ASME B107.9M-1994

WRENCHES, BOX, ANGLED, OPEN END, COMBINATION,
FLARE NUT, AND TAPPET (METRIC SERIES)**TABLE 7B TYPE III, STYLE 2, COMBINATION WRENCH, OPEN END, 15 deg. OFFSET BOX
OPENING, SHORT LENGTH**

Wrench Opening Across Flats	Width of Open Head	Outside Diameter of Box	Permitted Eccentricity of Wrench Openings to Outside Diameter	Thickness of Wrench Heads		Overall Length	Proof Load <i>N-M</i>	
				Open Head	Box Head		Open Head	Box Head
	Max.	Max.	Max.	Max.	Max.	Max.	Min.	Min.
mm	mm	mm	mm	mm	mm	mm	Nm	Nm
4	10.8	7.6	.38	3.7	4.0	73	4	12
5	12.5	9.0	.38	3.9	4.6	78	5	17
5.5	13.4	9.8	.38	4.0	4.9	80	6	18
6	14.7	11.1	.38	4.7	6.6	100	7	20
7	16.0	11.9	.38	4.7	6.6	110	8	27
8	17.9	14.0	.38	5.1	7.4	115	15	30
9	20.0	15.5	.38	5.4	7.7	120	21	40
10	22.0	16.1	.38	5.9	8.2	125	31	71
11	24.2	18.5	.38	6.3	8.5	135	46	80
12	26.0	20.0	.38	6.6	8.6	145	49	91
13	28.2	20.9	.38	6.9	9.1	150	62	115
14	30.4	22.8	.46	7.5	9.8	165	86	158
15	32.3	24.1	.46	7.7	10.3	170	104	200
16	34.9	24.9	.46	7.9	11.0	180	124	248
17	36.9	26.9	.46	8.3	11.5	195	139	267
18	38.6	27.7	.46	8.7	12.1	205	155	304
19	40.8	29.4	.46	9.1	12.7	215	186	323

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

ASME B107.9M-1994

**TABLE 7C 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 Wrench Openings to Outside Diameter	Thickness of Wrench Heads		Overall Length		Proof Load <i>N-M</i>	
				Open Head	Box Head			Open Head	Box Head
	Max.	Max.	Max.	Max.	Max.	Min.	Max.	Min.	Min.
mm	mm	mm	mm	mm	mm	mm	mm	Nm	Nm
5.5	15.5	11.8	0.38	5.3	6.0	120	130	5	18
6	17.3	12.7	0.38	5.6	7.4	125	135	7	20
7	17.6	14.3	0.38	5.6	7.4	129	145	8	27
8	21.4	15.0	0.38	5.9	7.5	137	161	15	30
9	21.4	17.4	0.38	6.0	8.5	143	167	21	40
10	24.4	18.8	0.38	6.5	9.0	163	175	31	71
11	26.0	19.9	0.38	6.9	10.0	177	189	46	80
12	27.7	21.4	0.38	7.3	10.0	190	199	49	91
13	30.2	23.1	0.38	7.7	10.5	200	213	62	115
14	32.8	24.4	0.46	8.2	11.5	214	229	86	158
15	34.8	26.0	0.46	8.9	11.5	226	245	104	200
16	36.4	27.0	0.46	8.9	12.1	231	260	124	248
17	39.7	29.3	0.46	9.7	12.6	241	275	139	267
18	41.0	29.3	0.46	9.7	12.6	250	290	155	304
19	42.7	31.2	0.46	10.0	14.8	277	305	186	323
20	44.2	31.8	0.51	10.1	14.8	289	335	217	347
21	47.6	33.8	0.51	10.2	16.3	296	350	248	372
22	48.3	35.6	0.51	10.9	16.3	314	365	279	408
23	51.5	37.3	0.51	11.4	16.5	324	384	310	455
24	53.5	38.1	0.51	11.6	16.5	333	396	341	509
25	55.5	40.2	0.51	12.0	17.5	353	409	372	559
26	57.2	42.2	0.58	12.0	18.0	367	415	403	608
27	60.2	44.2	0.58	12.5	19.0	374	430	432	671
28	62.3	45.3	0.58	13.3	19.0	387	445	497	710
29	65.5	45.3	0.58	13.7	19.5	400	460	514	750
30	67.0	47.5	0.58	14.9	20.0	416	475	570	795
31	68.6	48.6	0.58	14.9	20.5	428	490	610	850
32	71.0	49.8	0.58	14.9	21.5	440	505	650	905
33	73.0	50.3	0.58	15.3	22.3	454	515	700	950

TABLE 8 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 <i>N-M</i>	
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.
mm	mm	mm	mm	mm	mm	mm	mm	mm	Nm	Nm
7	8	17.3	19.0	4.7	4.7	7.6	8.4	101	11	12
7	9	17.3	21.8	4.7	4.7	7.6	9.6	109	11	14
8	10	19.0	23.3	5.0	5.5	8.4	10.1	116	12	15
9	11	21.9	23.7	4.7	6.4	9.6	10.5	123	14	16
10	12	23.3	25.5	5.5	7.0	10.1	10.5	135	15	17
11	13	23.7	26.7	6.4	8.7	10.5	10.9	142	16	22
12	14	25.5	27.8	7.0	9.5	11.1	12.0	140	17	31
13	14	26.7	27.8	8.7	9.5	11.1	12.0	150	22	31
15	17	29.5	32.0	10.3	12.0	12.0	13.5	170	36	45
16	17	29.8	32.0	11.4	12.0	12.0	13.5	170	41	45
16	18	29.8	31.8	11.4	13.0	12.0	13.3	177	41	50
18	20	33.6	37.5	13.0	14.0	14.0	14.0	180	50	72
19	21	35.9	41.3	13.6	15.1	14.9	15.2	184	56	80
19	22	35.9	41.3	13.6	15.9	14.9	15.2	190	56	90

**TABLE 9 TYPE V, FLARE NUT COMBINATION WRENCH, OPEN END AND 15
deg. OFFSET BOX OPENING**

Wrench Opening Across Flats	Outside Diameter of Heads		Circumferential Opening	Thickness of Wrench Heads		Overall Length	Proof Load <i>N-M</i>	
	Open Head	Flare Head		Open Head	Flare Head		Open Head	Flare Head
	Max.	Max.	Flare Head	Max.	Max.		Min.	Min.
mm	mm	mm	mm	mm	mm	mm	Nm	Nm
8	21.5	19.0	4.5	8.5	8.5	100	15	13
9	21.5	22.0	6.0	10.0	10.0	103	21	14
10	24.5	23.5	6.0	10.5	10.5	119	31	15
11	26.0	24.0	7.0	10.5	10.5	124	46	16
12	28.0	25.5	7.0	10.5	10.5	140	49	17
13	30.5	27.0	8.5	11.0	11.0	143	62	22
14	33.0	28.0	10.0	12.0	12.0	150	86	31
15	35.0	29.0	10.5	12.0	12.0	153	104	36
16	36.5	29.8	11.0	12.0	12.0	156	124	41
17	40.0	31.0	12.0	13.5	13.5	162	139	45
18	41.0	32.0	12.5	13.5	13.5	170	155	50
19	42.0	34.0	13.0	14.0	14.0	180	180	55

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

ASME B107.9M-1994

**TABLE 10A TYPE VI, STYLE 1 AND 2, ANGLE WRENCH,
DOUBLE HEAD, OPEN END**

Wrench Opening Across Flats	Width of Open Head	Thickness of Heads	Overall Length	Proof Load <i>N-M</i>
	Max.	Max.	Max.	Min.
mm	mm	mm	mm	Nm
9	20.1	5.6	130	4
10	21.8	6.2	135	4
11	23.7	6.3	142	8
12	25.5	6.7	150	12
13	27.5	6.8	160	15
14	30.3	7.2	170	18
15	31.5	7.4	180	18
16	34.1	7.7	190	23
17	36.0	7.8	200	34
18	38.0	8.0	210	50
19	39.5	8.2	220	57
21	43.5	8.6	236	95
22	45.5	8.8	247	119
24	49.5	9.2	262	174
27	55.5	9.8	291	280

**TABLE 10B TYPE VI, CLASS 1, ANGLE WRENCH, DOUBLE HEAD, OPEN
END, 15 deg. AND 60 deg.**

Wrench Opening Across Flats		Width of Heads		Head Thickness	Overall Length	Proof Load <i>N-M</i>	
A	B	A	B	A		15 deg. Head	60 deg. Head
15 deg. Head	60 deg. Head	15 deg. Head	60 deg. Head	Both Heads	Min.	Min.	Min.
mm	mm	mm	mm	mm	mm	Nm	Nm
3.2	5.5	8.91	12.70	3.37	74.70	0.90	4.51
5.5	3.2	12.70	8.91	3.37	83.90	4.51	0.90
4	5	9.80	11.17	3.24	78.00	1.80	3.50
5	4	11.17	9.80	3.24	81.80	3.50	1.80
6	7	13.97	16.25	3.57	85.90	5.87	9.03
7	6	16.25	13.97	3.57	90.00	9.03	5.87
8	9	19.25	21.08	3.73	94.00	13.21	18.30
9	8	21.08	19.25	3.73	97.90	18.30	13.21
10	11	22.68	24.86	4.03	101.90	24.73	32.19
11	10	24.86	22.68	4.03	106.00	32.19	24.73

ASME B107.9M-1994

WRENCHES, BOX, ANGLED, OPEN END, COMBINATION,
FLARE NUT, AND TAPPET (METRIC SERIES)**TABLE 11 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 <i>N-M</i>	
<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>	<i>A</i>		Small Head	Large Head
Small Head	Large Head	Small Head	Large Head	Both Heads		Min.	Min.
		Max.	Max.	Max.	Min.	Min.	Min.
mm	mm	mm	mm	mm	mm	Nm	Nm
6	7	16.4	18.4	4.0	114	4	6
8	9	20.4	21.9	4.2	120	9	13
8	10	20.4	24.4	4.4	125	9	17
10	11	24.4	26.4	4.5	136	17	21
12	13	28.4	30.4	4.7	142	26	32
12	14	28.4	32.4	4.7	147	26	38
13	15	30.4	34.4	4.8	152	32	46
14	15	32.4	34.4	4.8	150	38	46
16	18	36.6	41.0	5.0	169	53	71
17	19	38.8	43.2	5.1	174	62	81
19	22	43.2	48.3	5.6	185	81	116
21	24	46.3	52.3	6.0	196	103	143
27	30	56.0	62.0	7.1	310	187	238

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

ASME B107.9M-1994

**TABLE 12 HEXAGON MANDREL
DIMENSIONS (METRIC)**

Nominal Size of Wrench Opening	Hexagon Mandrel Dimensions	
	Across Flats Tolerances	Across Corners Minimum (Note 1)
3.2	+ 0.025 – 0.050	3.57
4	+ 0.025 – 0.050	4.46
5	+ 0.025 – 0.050	5.58
5.5	+ 0.025 – 0.050	6.13
6	+ 0.025 – 0.050	6.68
6.3	+ 0.025 – 0.050	7.02
7	+ 0.025 – 0.050	7.79
8	+ 0.025 – 0.050	8.95
9	+ 0.025 – 0.050	10.11
10	+ 0.025 – 0.050	11.27
11	+ 0.025 – 0.050	12.40
12	+ 0.025 – 0.076	13.53
13	+ 0.025 – 0.076	14.67
14	+ 0.025 – 0.076	15.80
15	+ 0.025 – 0.076	16.92
16	+ 0.025 – 0.076	18.06
17	+ 0.025 – 0.076	19.20
18	+ 0.025 – 0.076	20.35
19	+ 0.025 – 0.076	21.49
20	+ 0.025 – 0.076	22.64
21	+ 0.025 – 0.076	23.78
22	+ 0.025 – 0.076	24.93
23	+ 0.025 – 0.076	26.07
24	+ 0.025 – 0.076	27.20
25	+ 0.025 – 0.076	28.27
26	+ 0.025 – 0.076	29.38
27	+ 0.025 – 0.076	30.53
28	+ 0.025 – 0.076	31.67
29	+ 0.025 – 0.076	32.81
30	+ 0.025 – 0.076	33.96
31	+ 0.025 – 0.076	35.10
32	+ 0.025 – 0.076	36.25
34	+ 0.025 – 0.076	38.52
35	+ 0.025 – 0.076	39.68
36	+ 0.025 – 0.076	40.83
38	+ 0.025 – 0.076	43.11
40	+ 0.025 – 0.177	45.32
41	+ 0.025 – 0.177	46.45
46	+ 0.025 – 0.177	52.12
50	+ 0.025 – 0.177	56.65

NOTE: (1) Calculated by $(N \times 1.155) - (N \times 1.155 \times 0.0190)$.
Applicable to mandrels over 38 mm nominal size.

AMERICAN NATIONAL STANDARDS FOR HAND TOOLS

Socket Wrenches, Hand (Inch Series)	B107.1-1993
Socket Wrenches, Extensions, Adaptors, and Universal Joints, Power Drive (Impact) (Inch Series)	B107.2-1992
Socket Wrenches, Power Drive (Non-Impact) (Inch Series)	B107.3-1978(R1991)
Driving and Spindle Ends for Portable Hand, Air, and Electric Tools	B107.4-1982(R1988)
Socket Wrenches, Hand (Metric Series)	B107.5M-1994
Wrenches, Box, Angled, Open End, Combination, Flare Nut, and Tappet (Inch Series)	B107.6-1994
Adjustable Wrenches	B107.8M-1991
Wrenches, Box, Angled, Open End, Combination, Flare Nut, and Tappet (Metric Series)	B107.9M-1994
Handles and Attachments for Hand Socket Wrenches — Inch and Metric Series	B107.10M-1982(R1988)
Pliers, Diagonal Cutting, and Nippers, End Cutting	B107.11M-1993
Nut Drivers (Spin Type, Screwdriver Grip)	B107.12-1991
Pliers (Long Nose, Long Reach)	B107.13M-1985(R1991)
Hand Torque Tools	B107.14M-1994
Flat Tip and Phillips Screwdrivers	B107.15-1993
Shears (Metal Cutting, Bench and Hand)	B107.16-1992
Gages, Wrench Openings, Reference	B107.17M-1991
Pliers (Wire Twister)	B107.18M-1985(R1991)
Pliers, Retaining Ring	B107.19-1993
Pliers (Lineman's, Iron Worker's, Gas, Glass, and Fence)	B107.20M-1992
Wrench, Crowfoot Attachments	B107.21-1992
Electronic Cutters and Pliers	B107.22M-1991
Pliers, Multiple Position, Adjustable	B107.23-1991

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).

ASME B107.9M 94 0759670 0551509 741

ISBN #0-7918-2291-5

N08794