

ASME B107.33M-2002

SOCKET WRENCHES, IMPACT (METRIC SERIES)

AN AMERICAN NATIONAL STANDARD



The American Society of
Mechanical Engineers

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

SOCKET WRENCHES, IMPACT (METRIC SERIES)

ASME B107.33M-2002

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CONTENTS

Foreword	iv
Standards Committee Roster	v
Correspondence With the B107 Committee	vi
1 Scope	1
2 Classification	1
3 Normative References	1
4 Requirements	1
5 Test Procedures	3
6 Designations	4
Figures	
1 Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point)	2
2 Type III, Universal Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point)	3
Tables	
1 Type I, Single Hexagon (6-Point) and Double Hexagon (12-Point), 6.3 mm Drive	5
2 Type I, Single Hexagon (6-Point) and Double Hexagon (12-Point), 10 mm Drive	5
3 Type I, Single Hexagon (6-Point) and Double Hexagon (12-Point), 12.5 mm Drive	6
4 Type I, Single Hexagon (6-Point) and Double Hexagon (12-Point), 20 mm Drive	7
5 Type I, Single Hexagon (6-Point) and Double Hexagon (12-Point), 25 mm Drive	8
6 Type III, Universal Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 10 mm Drive	9
7 Type III, Universal Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 12.5 mm Drive	9
8 Hexagon Mandrel Dimensions and Maximum Depth of Mandrel Insertion	10

FOREWORD

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

The purposes of this Standard are to define general and dimensional data specifically applicable to detachable metric impact socket wrenches and to specify test methods to evaluate performance relating to the defined requirements.

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

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

The requirements of this Standard become effective at the time of publication. This American National Standard was approved on May 13, 2002.

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

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

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

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

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

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Attending Committee Meetings. The B107 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B107 Standards Committee.

SOCKET WRENCHES, IMPACT (METRIC SERIES)

1 SCOPE

This Standard is intended to cover the complete general and dimensional data for detachable socket wrenches for impact use.

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 or their representatives concerning lists of stock production sizes.

All dimensions in this Standard are in millimeters.

2 CLASSIFICATION

Type I: Sockets, single hexagon (6-point) and double hexagon (12-point) (see Fig. 1)

Type II: Future use

Type III: Universal Sockets, single hexagon (6-point) and double hexagon (12-point) (see Fig. 2)

3 NORMATIVE REFERENCES

The following is a list of publications referenced in this Standard.

ASME B107.4M-1995, Driving and Spindle Ends for Portable Hand, Impact, Air, and Electric Tools (Percussion Tools Excluded)

ASME B107.17M-1997, Gages, Wrench Openings, Reference

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

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

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

4 REQUIREMENTS

4.1 Illustrations

The illustrations shown herein are descriptive and not restrictive. They are not intended to preclude the manufacture of sockets that are otherwise in accordance with this Standard.

4.2 Materials

Unless otherwise specified, the material used in the tools shall be steel. The chemical composition and heat treatment of which shall be such as to produce tools conforming to the requirements hereinafter specified.

4.3 Dimensions

Dimensions shall be in accordance with applicable tables.

4.4 Marking

Sockets shall be marked in a plain and permanent manner with the manufacturer's name or with a trademark of such known character that the source of manufacture and country of origin may be readily determined. In addition, sockets shall be marked in a plain and permanent manner with the nominal size of the wrench opening (distance across flats) for nut, bolt, or screw end.

4.5 Proof Torque

When tested as specified, sockets shall withstand the proof torque specified in the applicable tables without failure or permanent deformation (set) that might affect the durability or serviceability of the wrenches.

4.6 Hardness

Sockets shall be hardened and shall have a hardness value for the various sizes within the range shown in the table below.

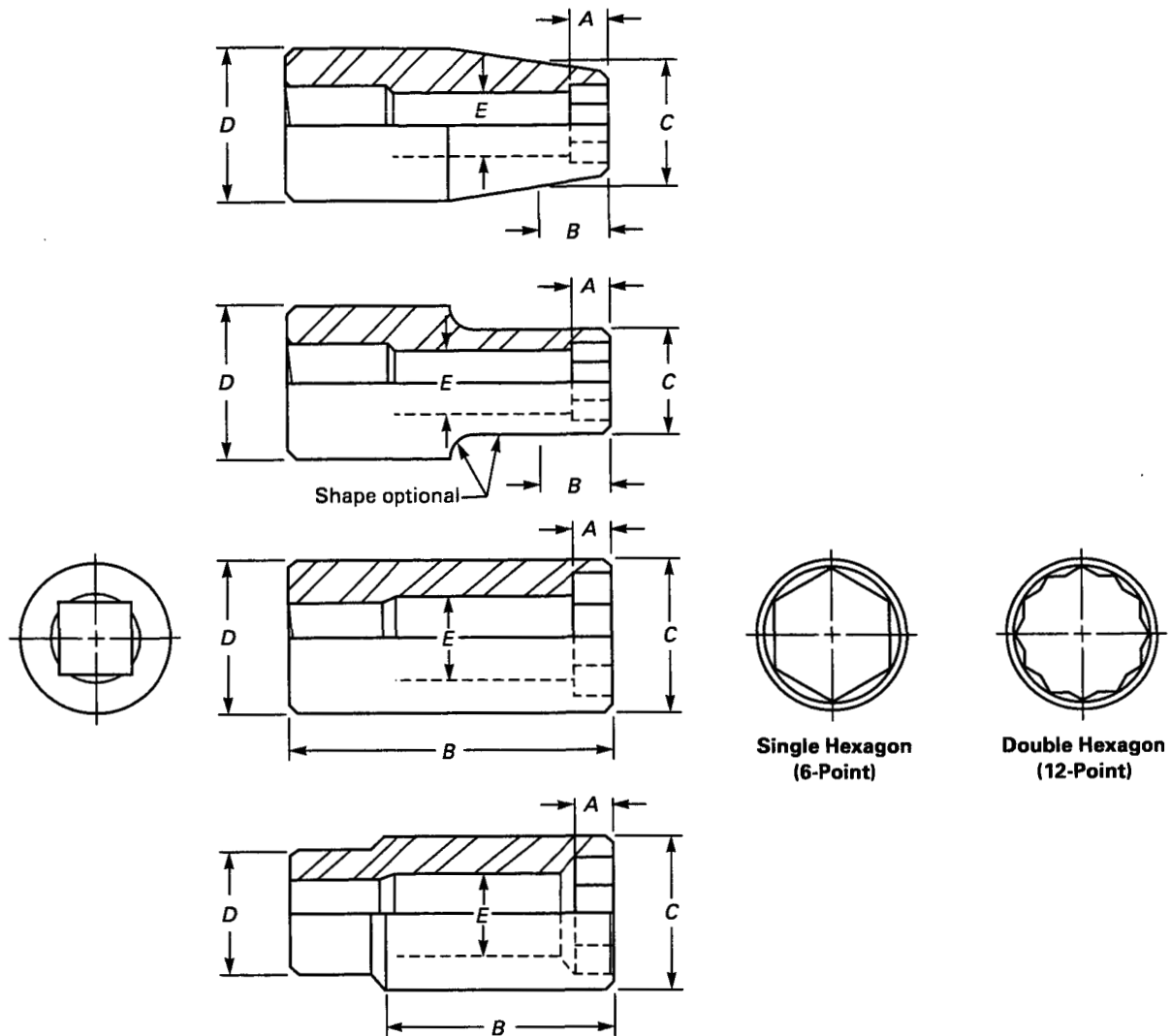
Drive Size, mm	HRC	
	Min.	Max.
6.3, 10, 12.5	38	55
20	38	52
25	35	50

4.7 Wrench Opening

Wrench opening sizes shall be such as to ensure acceptance with gages conforming to ASME B107.17M.

4.8 Finish

4.8.1 Surface. All external surfaces shall be free from pits, nodules, burrs, cracks, and other detrimental defects affecting serviceability.



GENERAL NOTES:

- (a) A shall be equal to or greater than nut opening depth in applicable tables.
- (b) Maximum nut end diameter of socket C shall not be exceeded for length B and shall conform to applicable tables.
- (c) B length shall be greater than or equal to the minimum nut opening depth A in applicable tables.

Fig. 1 Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point)

4.8.2 Coatings. The coatings shall be adherent, smooth, continuous, and free from uncoated areas. Sockets shall have one of the following coatings:

(a) *Phosphate Coating.* The coating shall consist of a chemically produced phosphate coating followed with a coating of rust preventative.

(b) *Oxide Coating.* The coating shall consist of a chemically produced oxide coating followed with a coating of rust preventative.

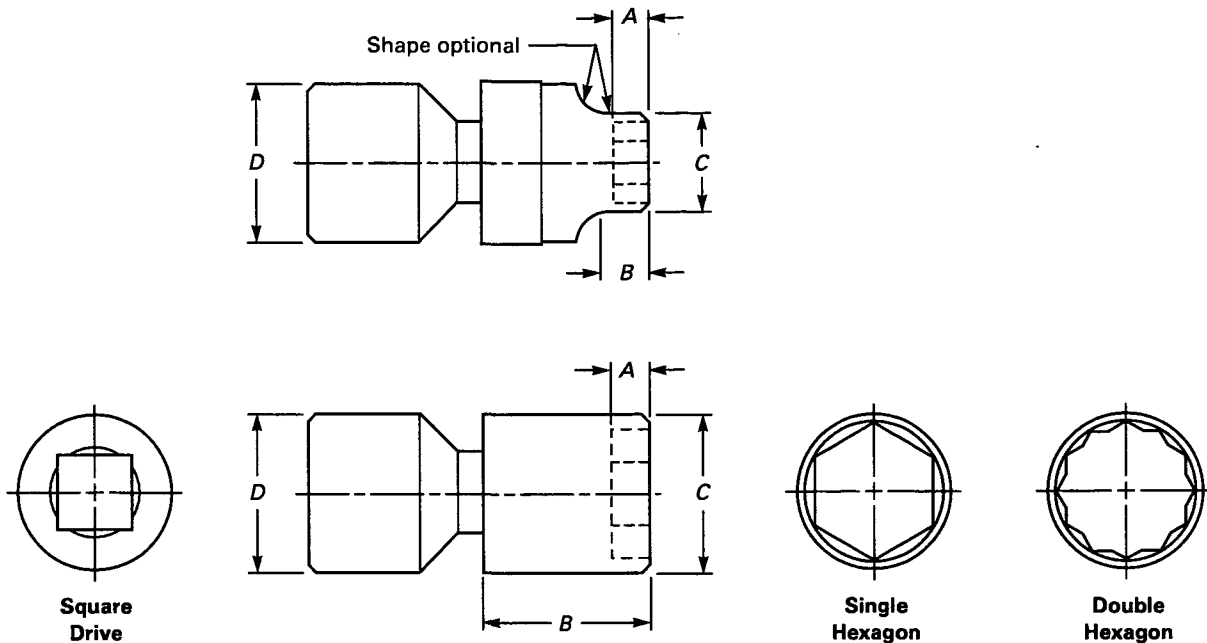
4.9 Bolt Clearance Hole

The bolt clearance hole shall be provided in all sockets except Class 3, Universal sockets. The minimum depth

for the bolt clearance hole, as measured from the nut end face, shall be 1.5 times the minimum hex depth for sockets with overall length less than:

Drive Size, mm	Overall Length, mm
6.3	38
10, 12.5	51
20, 25	76

or 0.5 times the overall length for sockets with overall length equal to or greater than:



GENERAL NOTES:

- (a) A shall be equal to or greater than nut opening depth in applicable tables.
- (b) Maximum nut end diameter of socket C shall not be exceeded for length B and shall conform to applicable tables.
- (c) B length shall be greater than or equal to the minimum nut opening depth A in applicable tables.
- (d) D is the outside diameter, drive end, and shall conform to applicable tables.

Fig. 2 Type III, Universal Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point)

Drive Size, mm	Overall Length, mm
6.3	38
10, 12.5	51
20, 25	76

4.10 Through Hole

A through hole having a minimum diameter equal to 50% of the square drive size or equal to the bolt clearance hole diameter as specified in the applicable table, whichever is smaller, shall be provided except in Type III, Universal Sockets.

4.11 Internal Drive Opening

All internal drive openings shall be well defined. The dimensions shall conform to ASME B107.4M.

4.12 Countersink of Nut End Socket Opening

The nut end wrench opening shall be countersunk with an included angle of 85 deg to 155 deg and a minimum diameter equal to the across-corners dimension of the opening.

4.13 External Corners

External corners shall be broken with no sharp edges.

4.14 Type I — Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point) Sockets

Sockets shall be similar to Fig. 1 and shall conform to Tables 1 through 5.

4.15 Type III — Universal Sockets

Universal sockets shall have a single hexagon (6-point) or double hexagon (12-point) design as specified. Universal sockets shall be provided with a friction type tension device that will hold the drive end and socket or tang end in any set position with a force adequate to hold the socket against gravity. The tension device shall compensate for wear. Universal sockets shall be capable of rotation in a complete revolution when the angular deviation of one member from the common centerline is 20 deg minimum and 35 deg maximum. Type III, Universal Sockets shall be similar to Fig. 2 and shall conform to Tables 6 and 7 for the size and drive specified.

5 TEST PROCEDURES

5.1 Hardness

Hardness range specified in para. 4.4 shall be tested on a Rockwell tester, using a diamond penetrator and

employing a 150 kg major load in accordance with ASTM E 18. When surface preparation is necessary, the amount of material removed in the area contacted by the indicator shall not exceed:

Drive Size, mm	Max. Material Removed
6.3, 10, 12.5	0.18 mm
20	0.38 mm
25	0.25 mm per 25 mm of diameter

5.2 Proof Torque Test

Sockets shall meet the proof torque specified in the applicable tables. Socket wrench and drive openings shall be gaged prior to testing and only sockets that are in accordance with the gage shall be tested. Gages shall be in accordance with ASME B107.4M and B107.17M. They shall be torqued to the proof torque using the mandrel depth specified. Following the removal of the proof torque, they shall be regaged. Marking at mandrel contact points is allowable. Any socket that cracks, fractures, or does not gage after torquing shall be considered to have failed the test.

5.2.1 Type I, Sockets. A square test plug of suitable strength and in compliance with the dimensional requirements of the drive tang specified in ASME B107.4M shall be employed. The test plug may be driven by any suitable manual or mechanical means. The socket

shall then be engaged on the end of a mandrel to maximum insertion depth in accordance with applicable tables. Means may be provided at the outer end of the test plug to prevent slippage of the socket end-wise from the mandrel and to keep the test pieces in alignment.

5.2.2 Type III, Universal Sockets. Tests shall be made in the same manner as specified in para. 5.2.1 except that means shall be provided to keep the parts of the universal socket assembly in the axis that the torque is applied.

5.2.3 Mandrels for Wrench Openings. Sockets shall be tested on mandrels. Single hexagon (6-point) or double hexagon (12-point) sockets or universal sockets shall be tested on hexagonal mandrels. The size of all socket opening mandrels shall conform to Table 8. Mandrels shall be hardened to not less than 56 HRC and shall be smoothly finished.

6 DESIGNATIONS

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

- (a) impact socket
- (b) drive size
- (c) type
- (d) wrench opening size and configuration
- (e) length

EXAMPLE: Impact Socket, 12.5 mm drive size, Type I, 18 mm Opening Single Hexagon, 38.1 mm overall length.

Table 1 Type I, Single Hexagon (6-Point) and Double Hexagon (12-Point), 6.3 mm Drive

Nominal Opening, mm	Outside Diameter, mm				Minimum Nut Opening Depth, A, mm	Min. Bolt Clearance Hole Diameter, E, mm	Minimum Proof Torque, N·m
	Nut End, C		Drive End, D				
	Min.	Max.	Min.	Max.			
5	8.0	9.1	11.7	14.0	2.80	3.18	10
5.5	8.7	9.7	11.7	14.0	2.80	3.56	14
6	9.3	10.6	11.7	14.0	3.05	3.56	16
7	10.6	11.6	11.9	14.0	3.55	4.32	27
8	11.7	12.8	12.4	14.0	3.55	5.33	38
9	12.8	14.1	13.0	16.0	4.05	5.33	49
10	13.9	15.6	14.0	16.0	4.60	6.60	63
11	15.1	16.6	14.4	16.7	5.45	7.62	68
12	16.4	17.8	14.4	17.7	6.10	8.33	68
13	17.8	19.1	15.0	19.1	6.75	8.33	68
14	19.1	20.7	19.1	21.0	7.50	10.35	68
15	20.3	21.6	20.3	22.0	7.50	10.35	68

Table 2 Type I, Single Hexagon (6-Point) and Double Hexagon (12-Point), 10 mm Drive

Nominal Opening, mm	Outside Diameter, mm				Minimum Nut Opening Depth, A, mm	Min. Bolt Clearance Hole Diameter, E, mm	Minimum Proof Torque, N·m
	Nut End, C		Drive End, D				
	Min.	Max.	Min.	Max.			
8	11.7	14.5	16.3	20.0	3.55	5.33	52
9	13.1	15.7	16.3	20.0	4.05	5.33	66
10	13.9	17.0	16.3	20.0	4.60	6.60	82
11	15.1	18.2	17.1	20.0	5.45	7.62	112
12	16.4	19.4	17.1	20.0	6.10	8.33	124
13	17.8	20.7	17.9	28.0	6.75	8.33	147
14	19.1	21.9	19.1	28.0	8.35	10.35	175
15	20.3	23.1	20.3	28.0	8.35	10.35	203
16	21.5	24.4	20.3	28.0	9.55	11.68	237
17	23.3	25.6	20.3	28.0	9.55	12.35	249
18	23.8	26.9	20.3	28.0	10.15	12.35	249
19	25.1	28.1	20.3	28.0	11.00	13.50	249
20	27.2	29.3	20.3	34.0	11.00	14.00	249
21	28.5	30.6	20.3	34.0	11.70	15.00	249
22	29.5	31.8	20.3	34.0	12.45	15.00	249
23	30.8	33.0	20.3	34.0	12.70	16.00	249
24	31.8	34.3	20.3	34.0	13.85	17.50	249

Table 3 Type I, Single Hexagon (6-Point) and Double Hexagon (12-Point), 12.5 mm Drive

Nominal Opening, mm	Outside Diameter, mm				Minimum Nut Opening Depth, A, mm	Min. Bolt Clearance Hole Diameter, E, mm	Minimum Proof Torque, N·m
	Nut End, C		Drive End, D				
	Min.	Max.	Min.	Max.			
9	15.0	16.5	21.0	28.0	4.05	5.33	110
10	15.1	17.8	21.0	28.0	4.60	6.60	153
11	16.4	19.0	21.0	28.0	5.45	7.62	170
12	17.7	20.8	21.0	28.0	6.10	8.33	203
13	19.2	21.5	21.0	28.0	6.75	8.33	249
14	20.6	22.8	23.0	37.0	8.35	10.35	282
15	22.0	26.0	23.0	37.0	8.35	10.35	339
16	23.5	28.8	23.0	37.0	9.55	11.68	407
17	24.9	28.8	24.0	37.0	9.55	12.35	475
18	26.4	28.8	24.3	37.0	10.15	12.35	542
19	27.8	32.0	25.0	37.0	11.10	13.50	565
20	29.1	32.0	25.0	37.0	11.50	14.00	570
21	29.8	32.0	25.0	37.0	11.70	15.00	570
22	30.5	33.6	25.0	37.0	12.45	15.00	570
23	32.6	35.1	26.0	37.0	12.70	16.00	570
24	34.0	36.3	26.0	37.0	13.85	17.50	570
25	34.8	38.1	26.0	40.0	14.00	18.30	570
26	36.7	38.3	26.0	40.0	14.60	18.30	570
27	37.9	40.2	27.7	44.5	15.80	18.30	570
29	40.4	44.5	27.7	44.5	16.65	20.00	570
30	40.4	44.6	27.7	44.6	16.65	20.00	570
32	42.7	47.2	27.7	48.0	18.30	23.00	570
34	42.7	49.5	27.7	49.5	20.00	23.00	570
35	49.3	52.7	27.7	53.0	20.00	23.00	570
36	49.6	54.0	28.0	54.5	20.00	26.00	570

Table 4 Type I, Single Hexagon (6-Point) and Double Hexagon (12-Point), 20 mm Drive

Nominal Opening, mm	Outside Diameter, mm				Minimum Nut Opening Depth, A, mm	Min. Bolt Clearance Hole Diameter, E, mm	Minimum Proof Torque, N·m
	Nut End, C		Drive End, D				
	Min.	Max.	Min.	Max.			
17	27.5	31.9	37.9	48.0	9.55	12.35	554
18	28.0	32.2	37.9	48.0	10.15	12.35	610
19	30.1	33.6	37.9	48.0	11.10	13.50	780
20	31.9	34.9	38.4	48.0	11.50	14.00	780
21	33.8	37.4	38.9	48.0	11.70	15.00	930
22	33.8	40.7	38.9	48.0	12.45	15.00	972
23	37.4	41.3	38.9	48.0	12.70	16.00	1015
24	37.4	42.0	39.0	48.0	13.85	17.50	1085
25	40.2	43.0	39.0	48.0	14.00	18.30	1160
26	40.2	43.5	39.0	48.0	14.60	18.30	1240
27	40.2	45.0	39.0	49.5	15.80	18.30	1330
28	43.5	45.5	40.4	49.5	16.25	19.00	1420
29	45.4	47.3	40.4	49.5	16.65	20.00	1520
30	45.4	51.0	40.4	49.8	16.65	20.00	1640
31	46.7	51.5	41.1	49.8	17.80	22.00	1730
32	47.7	51.7	41.7	58.0	18.30	23.00	1820
33	49.8	51.7	42.5	58.0	19.05	24.00	2000
34	49.8	55.8	42.5	58.0	20.00	24.00	2000
35	51.3	57.2	43.0	58.0	20.10	24.00	2030
36	52.9	58.0	43.6	58.0	21.45	26.00	2030
38	55.1	60.6	43.6	58.0	22.25	27.00	2030
40	59.1	63.5	43.6	58.0	22.75	29.00	2030
41	59.1	65.2	44.2	58.0	24.90	30.50	2030
42	61.7	65.2	44.2	58.0	25.40	31.00	2030
43	62.5	65.3	44.2	58.0	25.40	31.00	2030
46	66.0	71.3	44.2	68.0	28.60	32.50	2030
50	69.3	74.8	44.2	68.0	29.75	36.50	2030

Table 5 Type I, Single Hexagon (6-Point) and Double Hexagon (12-Point), 25 mm Drive

Nominal Opening, mm	Outside Diameter, mm				Minimum Nut Opening Depth, A, mm	Min. Bolt Clearance Hole Diameter, E, mm	Minimum Proof Torque, N·m
	Nut End, C		Drive End, D				
	Min.	Max.	Min.	Max.			
19	33.4	38.0	48.6	58.0	11.10	13.50	723
22	37.9	41.6	48.6	58.0	12.45	15.00	927
24	38.7	44.0	48.6	58.0	13.85	17.50	1074
27	42.3	46.7	48.6	58.0	15.80	18.30	1322
28	44.8	46.7	48.6	58.0	16.25	19.00	1401
30	45.5	54.2	51.4	58.0	16.65	20.00	1582
32	47.7	54.2	51.4	58.0	18.30	23.00	1763
33	51.3	54.2	51.4	58.0	19.05	24.00	1853
35	51.3	58.0	51.4	58.0	20.10	24.00	2400
36	55.1	58.0	51.4	58.0	21.45	26.00	2530
38	55.1	61.0	51.4	58.0	22.25	27.00	2640
41	59.1	64.4	51.4	58.0	24.90	30.50	2820
46	66.0	71.3	57.7	68.0	28.60	32.50	3160
50	69.3	76.9	58.4	68.0	29.75	36.50	3160
52	74.3	77.9	58.4	68.0	29.75	37.00	3160
54	76.9	83.4	58.4	68.0	30.95	39.50	3160
55	81.7	83.4	58.4	68.0	33.55	39.50	3160
60	84.1	89.8	58.4	68.0	35.00	39.50	3160
65	89.4	95.9	58.4	70.6	35.00	39.50	3160
70	94.8	98.0	58.4	70.6	35.00	39.50	3160

**Table 6 Type III, Universal Sockets,
Single Hexagon (6-Point) and Double Hexagon (12-Point), 10 mm Drive**

Nominal Opening, mm	Outside Diameter, mm				Minimum Nut Opening Depth, A, mm	Minimum Proof Torque, N·m
	Nut End, C		Drive End, D			
	Min.	Max.	Min.	Max.		
8	12.6	14.1	20.0	24.4	3.55	37
9	13.8	15.3	20.0	24.4	4.05	52
10	15.0	19.3	20.0	24.4	4.60	57
11	16.2	19.3	20.0	24.4	5.45	69
12	17.4	19.3	20.0	24.4	6.10	77
13	18.6	20.9	20.0	28.0	6.75	82
14	19.8	22.5	20.0	28.0	7.00	84
15	20.7	22.9	20.0	28.0	7.00	85
16	22.2	24.1	20.0	28.0	8.00	85
17	23.1	25.7	20.0	28.0	8.00	85
18	24.6	26.7	20.0	28.0	9.00	85
19	25.8	28.8	20.0	28.0	9.00	85
20	26.5	29.4	22.7	28.0	11.50	85
21	27.5	30.2	22.7	28.0	11.70	85
22	29.0	31.8	22.7	28.0	12.00	85
23	30.0	33.3	22.7	28.0	12.70	85
24	31.0	34.9	22.7	28.0	13.85	85

**Table 7 Type III, Universal Sockets,
Single Hexagon (6-Point) and Double Hexagon (12-Point), 12.5 mm Drive**

Nominal Opening, mm	Outside Diameter, mm				Minimum Nut Opening Depth, A, mm	Minimum Proof Torque, N·m
	Nut End, C		Drive End, D			
	Min.	Max.	Min.	Max.		
10	15.0	20.7	22.5	28.0	4.60	57
11	16.5	20.7	22.5	28.0	5.45	69
12	18.0	21.7	22.5	28.0	6.10	96
13	19.5	22.6	22.5	28.0	6.75	120
14	21.1	24.6	22.5	37.0	8.00	145
15	22.5	25.4	23.7	37.0	8.00	160
16	23.8	26.6	25.6	37.0	8.50	170
17	25.5	27.9	27.5	37.0	9.00	190
18	26.6	30.1	28.5	37.0	9.50	200
19	28.0	32.0	28.5	37.0	10.50	200
21	30.4	32.9	28.5	37.0	11.70	200
22	31.6	34.4	28.5	37.0	12.45	200
24	34.3	36.4	28.7	37.0	13.85	200

**Table 8 Hexagon Mandrel Dimensions
and Maximum Depth of Mandrel Insertion**

Nominal Size of Wrench Opening, <i>N</i> , mm	Hexagon Mandrel Dimensions, mm			Maximum Depth of Mandrel Insertion, mm
	Across Flats Tolerances		Minimum Across Corners [Note (1)]	
	Plus	Minus		
5	0.025	0.050	5.58	2.00
5.5	0.025	0.050	6.13	2.40
6	0.025	0.050	6.68	2.60
7	0.025	0.050	7.79	3.20
8	0.025	0.050	8.95	4.00
9	0.025	0.050	10.11	4.40
10	0.025	0.050	11.27	4.80
11	0.025	0.050	12.40	5.60
12	0.025	0.076	13.53	6.00
13	0.025	0.076	14.67	6.40
14	0.025	0.076	15.80	7.00
15	0.025	0.076	16.92	7.40
16	0.025	0.076	18.06	8.00
17	0.025	0.076	19.20	8.80
18	0.025	0.076	20.35	9.60
19	0.025	0.076	21.49	10.20
20	0.025	0.076	22.64	10.60
21	0.025	0.076	23.78	11.20
22	0.025	0.076	24.93	11.80
23	0.025	0.076	26.07	12.20
24	0.025	0.076	27.20	12.80
25	0.025	0.076	28.27	13.40
26	0.025	0.076	29.38	13.80
27	0.025	0.076	30.53	14.40
28	0.025	0.076	31.67	15.00
29	0.025	0.076	32.81	15.40
30	0.025	0.076	33.96	16.00
31	0.025	0.076	35.10	16.40
32	0.025	0.076	36.25	16.80
33	0.025	0.076	37.38	17.20
34	0.025	0.076	38.52	17.60
35	0.025	0.076	39.68	18.40
36	0.025	0.076	40.83	19.20
38	0.025	0.076	43.11	20.20
40	0.025	0.177	45.32	21.20
41	0.025	0.177	46.45	21.60
42	0.025	0.177	47.59	22.00
43	0.025	0.177	48.72	22.50
46	0.025	0.177	52.12	24.00
50	0.025	0.177	56.65	26.40
52	0.025	0.177	58.92	27.40
54	0.025	0.177	61.18	28.40
55	0.025	0.177	62.32	28.80
58	0.025	0.177	65.72	30.20
60	0.025	0.177	67.98	31.20
65	0.025	0.177	73.65	33.60
70	0.025	0.177	79.31	36.00

NOTE:

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

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