ASME B107.110-2019

(Revision of ASME B107.110-2012)

Socket Wrenches, Handles, and Attachments

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

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The American Society of Mechanical Engineers
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FOREWORD

The American National Standards Committee B107, Socket Wrenches and Drives, under sponsorship of The American Society of Mechanical Engineers (ASME), was reorganized on June 28, 1967, as an ASME Standards Committee and its title was changed to Hand Tools and Accessories. In 1996 its scope was expanded to include safety considerations. In 1999 ASME initiated a project to consolidate hand tool standards by category of tool. The initial implementation included distinct standards within a single publication bearing a three-digit number corresponding to the responsible B107 subcommittee. Subsequent revisions are intended to integrate the component standards, resulting in a more traditional document. To maintain continuity within the user community, the former component standard numbers are renamed as categories in the consolidated standard, and designations are provided in Nonmandatory Appendix A.

The purposes of this Standard are to define dimensional, performance, and safety requirements specifically applicable to socket wrenches, handles, and attachments for hand socket wrenches; to specify test methods to evaluate performance relating to the defined requirements; and to indicate limitations of safe use.

This Standard may be used as a guide by state authorities or other regulatory bodies in the formulation of laws or regulations. It is also intended for voluntary use by establishments that use or manufacture the tools covered.

The 2012 edition of this Standard superseded ASME B107.1-2002, Socket Wrenches, Hand (Inch Series); ASME B107.2, Socket Wrenches, Extensions, Adaptors, and Universal Joints, Power Drive (Impact) (Inch Series); ASME B107.5M, Socket Wrenches, Hand (Metric Series); ASME B107.10, Handles and Attachments for Hand Socket Wrenches; ASME B107.12, Nutdrivers; ASME B107.33M, Socket Wrenches, Impact (Metric Series); and ASME B107.34, Socket Wrenches for Spark Plugs. Socket wrenches previously described in ASME B107.5M were included in Category 1. Socket wrenches and attachments previously described in ASME B107.33M were included in Category 2.

The 2012 edition completed the integration of the component standards into a single document. Principal changes in that edition were increased proof load values for ratchet handles and attachments, and the addition of length classes.

Members of the Hand Tools Institute Wrench Standards Committee, through their knowledge and hard work, have been major contributors to the development of the B107 wrench standards. Their active efforts in the promotion of these standards are acknowledged and appreciated.

The format of this Standard is in accordance with The ASME Codes & Standards Writing Guide 2000. References to tables in U.S. Customary units and tables in SI units are in accordance with ASME Boiler and Pressure Vessel Code, 2013, Section VIII, Division 1, Appendix GG-2(b): "The table designation (e.g., table number) is the same for both the U.S. Customary and SI tables, with the addition of suffix 'M' to the designator for the SI table, if a separate table is provided. For some small tables, where interpolation is not required, SI units are placed in parentheses after the U.S. Customary unit." In general, separate SI tables are provided when product nominal sizes are in SI units.

ASME B107.110-2019 was approved by the B107 Standards Committee on April 5, 2019, and by the Board on Standards and Testing on August 19, 2019. It was approved as an American National Standard on August 29, 2019.

ASME B107 COMMITTEE
Hand Tools and Accessories

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

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Secretary, B107 Standards Committee
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Two Park Avenue
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http://go.asme.org/Inquiry

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

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

Proposing a Case. Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard and the paragraph, figure, or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

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

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the B107 Standards Committee at the above address. The request for an 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 in one or two words.
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. Please provide a condensed and precise question, composed in such a way that a "yes" or "no" reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of "Yes" or "No," with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

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

Moreover, ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the inquiry information submitted, it is the opinion of the Committee that the Inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The B107 Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the B107 Standards Committee. Future Committee meeting dates and locations can be found on the Committee Page at http://go.asme.org/B107committee.

SOCKET WRENCHES, HANDLES, AND ATTACHMENTS

1 SCOPE

This Standard provides performance and safety requirements for socket wrenches (sockets), handles used with these wrenches, nutdrivers, and attachments used with socket wrenches, hereinafter collectively referred to as tools. The tools covered in this Standard are listed by Category number in Table 3-1. The names and intended uses given in Table 3-1 are those generally recognized.

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

2 REFERENCES

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

ASME B107.4, Driving and Spindle Ends for Portable Hand, Impact, Air, and Electric Tools (Percussion Tools Excluded)
ASME B107.17, Gages and Mandrels for Wrench Openings
Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

ASTM B117, Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B537, Standard Practice for Rating of Electroplated Panels Subjected to Atmospheric Exposure
ASTM B571, Standard Practice for Qualitative Adhesion Testing of Metallic Coatings
ASTM D968, Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D2240, Standard Test Method for Rubber Property — Durometer Hardness
ASTM E18, Standard Test Methods for Rockwell Hardness of Metallic Materials
Publisher: The American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 (www.astm.org)

Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care
Publisher: Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591-3201 (www.hti.org)

SAE J1703, Motor Vehicle Brake Fluid
Publisher: Society of Automotive Engineers (SAE International), 400 Commonwealth Drive, Warrendale, PA 15096 (www.sae.org)

3 CLASSIFICATION

Categories, Types, Classes, and Styles of tools covered in this Standard are shown in Table 3-1 and the applicable figures indicated therein.[1]

4 PERFORMANCE REQUIREMENTS

The illustrations shown herein are descriptive and not restrictive, and are not intended to preclude the manufacture of tools that are otherwise in accordance with this Standard. Dimensions shall be in accordance with the applicable tables unless otherwise specified. Lengths in U.S. Customary tables are in inches; lengths in SI tables are in millimeters. Tools shall pass all applicable tests in section 5 and meet category requirements as applicable.

4.1 Design

4.1.1 Nut End Socket Opening. The internal wrench opening of a single-hexagon (6-point) or a double-hexagon (12-point) configuration, or a single-square (4-point) or a double-square (8-point) configuration shall conform to one of the following wrench opening designs.

(a) Standard Single- or Double-Hexagon Configuration. This design consists of a simple geometric single-hexagon (6-point) or a double-hexagon (12-point) configuration having an across-flats and an across-corner shape for fitting with commercial hexagon fasteners.

(b) Modified Single- or Double-Hexagon Configuration. This design consists of a geometric single-hexagon (6-point) or a double-hexagon (12-point) configuration that does not contact on the fastener's corners.

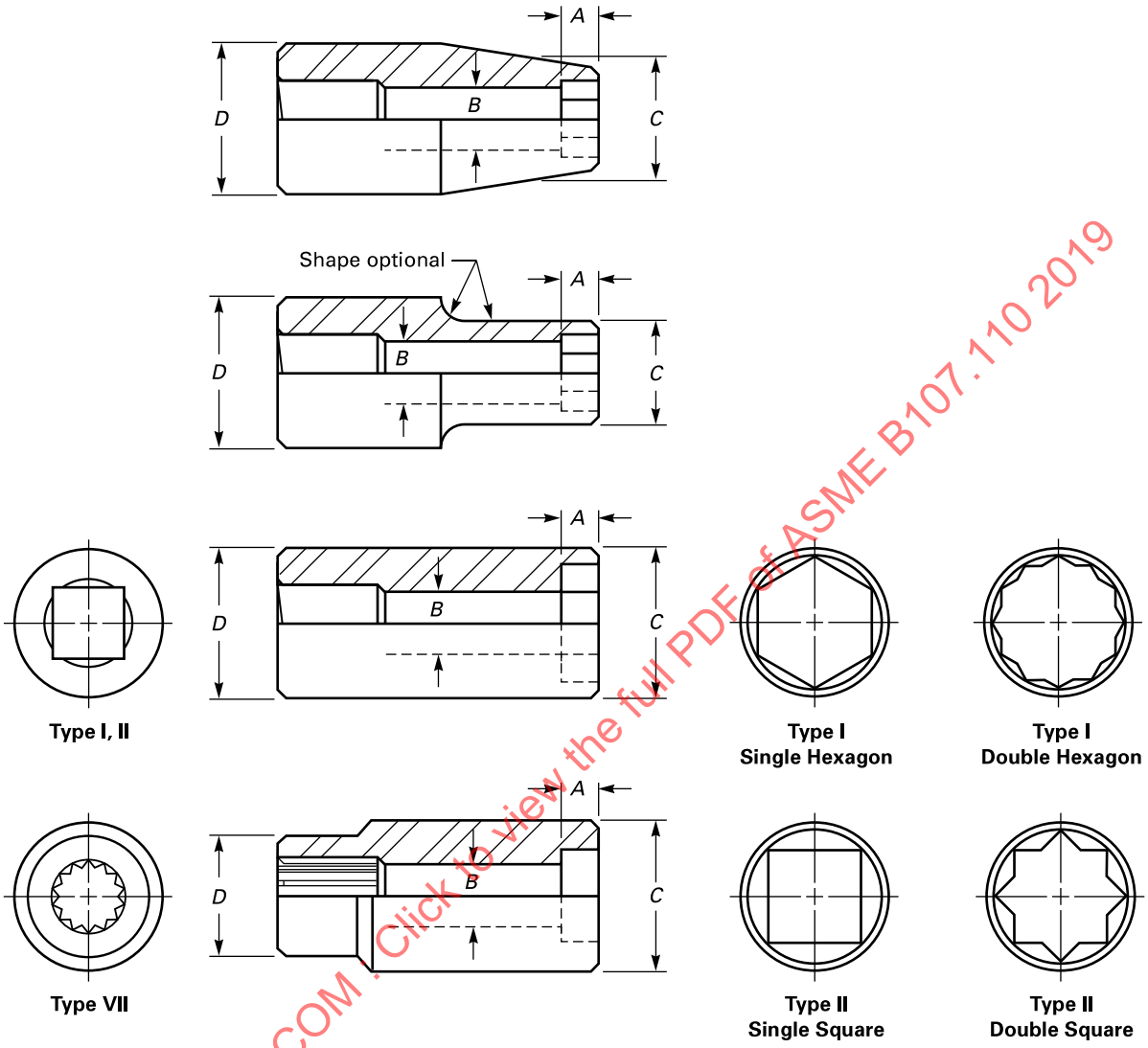
(c) Standard Single- or Double-Square Configuration. This design consists of a simple geometric single-square (4-point) or a double-square (8-point)

[1] Length classes are provided for Categories 1 and 2 socket wrenches in Tables 4.2.5-2 through 4.2.5-7M. Length ranges are provided for Category 10, Type II, Class 2, Style A attachments in Tables 4.2.3-2 and 4.3.2-3.

Table 3-1 Classification for Socket Wrenches

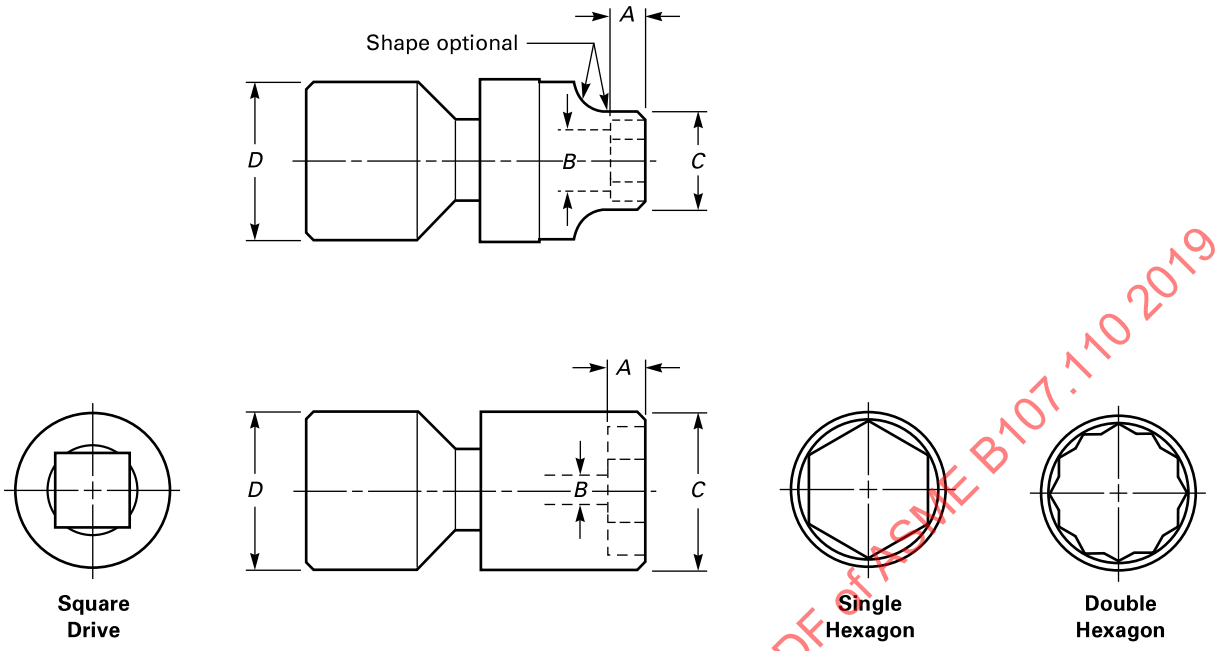
Category	Common Name	Type	Class	Style
1	Hand-driven socket wrenches: detachable socket wrenches with square drive for hand use (see Figures 3-1 and 3-2)	I — sockets, single hexagon (6-point) and double hexagon (12-point)	...	...
		II — sockets, single square (4-point) and double square (8-point)	...	...
		III — universal joint sockets, single hexagon (6-point) and double hexagon (12-point)	...	...
2	Socket wrenches, extensions, adapters, and universal joints, power drive (impact): detachable socket wrenches, extensions, adapters, and universal joints for power drive impact use	I — sockets, single hexagon (6-point) and double hexagon (12-point)	...	...
		II — sockets, single square (4-point) and double square (8-point)	...	...
		III — universal sockets, single hexagon (6-point) and double hexagon (12-point)	...	...
		IV — bars, extension	...	...
		V — adapters	...	...
		VI — universal joints	...	...
		VII — sockets, #5 spline drive, single hexagon (6-point) and double hexagon (12-point)	...	...
10	Handles and attachments for hand socket wrenches: the more common handles and attachments utilized by mechanics in repair and maintenance of vehicles, machinery, and other items	I — handles	1 — hinged	...
			2 — ratchet, reversible	...
			3 — speeder	A — brace type, single, revolving handgrip
				B — spin type, screwdriver grip
			4 — T-handle, sliding	...
		II — attachments	1 — universal joint	...
			2 — extension bar	A — solid
				B — flexible
			3 — adapter	A — socket wrench
				B — ratchet
12	Nutdrivers: with an integral socket and shaft that utilize a screwdriver-type handgrip	I — conventional length	1 — solid shaft	A — conventional handle
				B — cushion grip handle
			2 — hollow shaft	A — conventional handle
				B — cushion grip handle
		II — stubby length	...	A — conventional handle
				B — cushion grip handle
		III — miniature handle	...	...
34	Spark plug socket wrenches: detachable hand use socket wrenches with square drive for spark plugs	I — socket, single hexagon (6-point)	1 — regular length	...
			2 — long length	...
		II — universal sockets, single hexagon (6-point)	1 — square block	...
			2 — ball swivel	...

Figure 3-1 Category 1 and 2, Type I, II; and Category 2, Type VII Sockets



GENERAL NOTES:
(a) Type VII applies to Category 2 only.
(b) *C* measurement to be taken at depth *A* or more from nut end.

Figure 3-2 Category 1 and 2, Type III, Universal Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point)



GENERAL NOTE: *C* measurement to be taken at depth *A* or more from nut end.

configuration having an across-flats and an across-corner shape for fitting with commercial square fasteners.

The across-flats and across-corners tolerances of all wrench opening designs shall be as such to ensure acceptance when measured with gages conforming to ASME B107.17.

4.1.2 Bolt Clearance Hole for Category 1 and Category 2 Sockets. A space shall be provided for bolt clearance in all sockets except for Category 1 and Category 2, Type III universal joint sockets (Figure 3-2). The diameter of the bolt clearance hole shall be in accordance with that of the applicable size socket as specified in the applicable tables. The minimum depth for the bolt clearance hole, as measured from the nut end face, shall be 1.5 times the minimum opening depth, nut end for sockets with overall length less than the following:

Drive Size, in. (mm)	Overall Length, in. (mm)
¼ (6.3)	1.5 (38)
⅜, ½ (10, 12.5)	2.0 (51)
¾, 1 (20, 25)	3.0 (76)

or a minimum bolt clearance hole depth of 50% of the overall length for sockets with overall length equal to or greater than the length values listed above.

For Category 2, Type III universal joint sockets (Figure 3-2), all ⅜ in. drive universal sockets with overall length greater than 2.750 in. shall have minimum bolt clearance depth of 0.937 in., and all ½ in. drive universal sockets with overall length greater than 3.500 in. shall have minimum bolt clearance depth of 1.250 in.

4.1.3 Drive Ends. Drive ends, when provided, shall conform to ASME B107.4.

4.1.4 Countersink of Nut End Socket Opening. The nut end socket opening shall be countersunk with an included angle of 90 deg to 150 deg (for Category 34, the angle shall be 85 deg to 155 deg) and a minimum diameter equal to the across-corners dimension of the opening.

4.1.5 Category 1 Dimensions. Dimensions shall conform to Table 4.1.5-1 (Table 4.1.5-1M) through Table 4.1.5-11 (Table 4.1.5-11M) as applicable. See Figures 3-1 and 3-2.

Table 4.1.5-1 Category 1, Type I Sockets, Single Hexagon and Double Hexagon, ¼ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*			
1/8	0.250	0.510	0.094	0.078	35
5/32	0.281	0.510	0.094	0.093	60
3/16	0.338	0.510	0.094	0.125	95
7/32	0.382	0.510	0.109	0.125	135
1/4	0.425	0.510	0.125	0.141	190
9/32	0.457	0.510	0.141	0.156	250
5/16	0.510	0.510	0.141	0.172	320
11/32	0.547	0.547	0.156	0.203	400
3/8	0.597	0.597	0.156	0.281	500
7/16	0.683	0.683	0.219	0.281	500
1/2	0.697	0.697	0.266	0.344	500
9/16	0.778	0.778	0.328	0.406	500

Table 4.1.5-1M Category 1, Type I Sockets, Single Hexagon and Double Hexagon, ¼ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, N·m
	Nut End, *C*	Drive End, *D*			
3.2	6.10	12.95	1.60	1.98	7
4	7.10	12.95	2.40	2.35	8
4.5	7.60	12.95	2.60	2.97	9
5	8.15	12.95	2.80	3.18	10
5.5	8.90	12.95	2.80	3.56	14
6	9.90	12.95	3.05	3.56	16
6.3	9.90	12.95	3.15	3.95	21
7	10.90	12.95	3.55	4.32	27
8	12.20	12.95	3.55	5.33	38
9	13.45	13.45	4.05	5.33	49
10	14.75	14.75	4.60	6.60	63
11	16.00	16.00	5.45	7.62	68
12	17.30	17.30	6.10	8.33	68
13	18.55	18.55	6.75	8.33	68
14	19.80	19.80	8.35	10.35	68
15	21.50	21.50	8.35	11.35	68
16	22.00	22.00	8.75	11.68	68

Table 4.1.5-2 Category 1, Type I Sockets, Single Hexagon and Double Hexagon, 3/8 in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*			
1/4	0.472	0.690	0.125	0.141	270
9/32	0.496	0.690	0.141	0.156	350
5/16	0.521	0.690	0.141	0.172	440
11/32	0.567	0.690	0.156	0.203	550
3/8	0.613	0.690	0.156	0.281	660
7/16	0.683	0.690	0.219	0.281	930
1/2	0.751	0.880	0.266	0.344	1,240
9/16	0.814	0.880	0.328	0.406	1,610
19/32	0.852	0.885	0.352	0.428	1,800
5/8	0.890	0.890	0.375	0.450	2,000
11/16	0.968	0.968	0.375	0.469	2,200
3/4	1.110	1.110	0.437	0.531	2,200
13/16	1.141	1.141	0.453	0.594	2,200
7/8	1.250	1.250	0.500	0.656	2,200
15/16	1.310	1.310	0.500	0.656	2,200
1	1.380	1.380	0.547	0.656	2,200

Table 4.1.5-2M Category 1, Type I Sockets, Single Hexagon and Double Hexagon, 3/8 in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, N·m
	Nut End, *C*	Drive End, *D*			
5.5	10.10	17.60	2.80	3.56	14
6	10.10	17.60	3.05	3.56	25
6.3	10.10	17.60	3.15	3.95	29
7	11.05	17.60	3.56	4.32	37
8	12.20	17.60	3.56	4.75	52
9	13.60	17.60	4.05	5.33	66
10	15.00	17.60	4.60	6.60	82
11	16.75	17.60	5.45	7.62	112
12	17.80	22.40	6.10	8.33	124
13	18.80	22.40	6.75	8.33	147
14	20.00	22.40	8.35	10.35	175
15	22.40	22.40	8.35	10.35	203
16	22.50	22.50	9.50	11.68	237
17	23.80	23.80	9.50	12.35	249
18	24.60	24.60	10.15	12.35	249
19	25.70	25.70	11.10	14.30	249
20	27.76	27.76	11.10	14.30	249
21	28.80	28.80	11.60	15.10	249
22	30.00	30.00	12.35	16.66	249
23	31.30	31.30	12.35	16.66	249
24	32.50	32.50	12.75	18.35	249
25	33.00	33.00	13.25	18.35	249
26	35.00	35.00	13.75	18.35	249

Table 4.1.5-3 Category 1, Type I Sockets, Single Hexagon and Double Hexagon, ½ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*			
3/8	0.655	0.940	0.156	0.281	1,100
7/16	0.730	0.940	0.219	0.281	1,500
1/2	0.775	0.940	0.266	0.344	2,000
9/16	0.845	0.940	0.328	0.406	2,600
19/32	0.920	0.940	0.352	0.428	3,000
5/8	0.942	0.970	0.375	0.450	3,300
11/16	1.010	1.020	0.375	0.469	4,100
3/4	1.110	1.110	0.437	0.531	5,000
13/16	1.145	1.145	0.453	0.594	5,000
7/8	1.250	1.250	0.500	0.656	5,000
15/16	1.310	1.310	0.500	0.656	5,000
1	1.380	1.380	0.547	0.656	5,000
1 1/16	1.480	1.480	0.625	0.656	5,000
1 1/8	1.540	1.540	0.656	0.781	5,000
1 3/16	1.675	1.675	0.656	0.781	5,000
1 1/4	1.750	1.750	0.750	0.781	5,000
1 5/16	1.820	1.820	0.750	0.906	5,000
1 3/8	1.885	1.885	0.781	0.906	5,000
1 7/16	1.955	1.955	0.845	0.906	5,000
1 1/2	2.025	2.025	0.850	0.906	5,000

Table 4.1.5-3M Category 1, Type I Sockets, Single Hexagon and Double Hexagon, ½ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, N·m
	Nut End, *C*	Drive End, *D*			
8	14.00	23.87	3.75	4.75	80
9	15.10	23.87	4.05	5.33	110
10	16.80	23.87	4.60	6.60	153
11	18.20	23.87	5.45	7.62	170
12	18.70	23.87	6.10	8.33	203
13	20.25	23.87	6.75	8.33	249
14	21.80	23.87	8.35	10.35	282
15	22.40	23.87	8.35	10.35	339
16	23.87	23.87	9.50	11.68	407
17	24.75	24.75	9.50	12.35	475
18	26.14	26.14	10.15	12.35	542
19	27.20	27.20	11.10	14.30	565
20	27.95	27.95	11.50	14.30	570
21	28.95	28.95	11.70	15.10	570
22	30.20	30.20	12.45	16.66	570
23	31.30	31.30	12.70	16.66	570
24	32.50	32.50	13.85	18.35	570
25	33.40	33.40	14.00	18.35	570
26	35.95	35.95	14.60	18.35	570
27	36.75	36.75	15.80	20.35	570
28	37.80	37.80	16.25	20.35	570
29	39.50	39.50	16.65	20.35	570
30	42.40	42.40	16.65	22.35	570
31	43.20	43.20	17.80	22.35	570
32	44.05	44.05	19.00	22.35	570

Table 4.1.5-4 Category 1, Type I Sockets, Single Hexagon and Double Hexagon, ¾ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*			
¾	1.290	1.450	0.437	0.531	6,000
13/16	1.300	1.450	0.453	0.594	6,800
⅞	1.385	1.575	0.500	0.656	7,700
15/16	1.450	1.575	0.546	0.656	8,700
1	1.535	1.575	0.546	0.656	9,700
1 1/16	1.610	1.610	0.625	0.656	10,800
1 ⅛	1.690	1.690	0.656	0.781	11,900
1 3/16	1.750	1.750	0.656	0.781	13,000
1 ¼	1.870	1.870	0.750	0.781	14,200
1 5/16	1.920	1.920	0.765	0.906	15,400
1 ⅜	1.980	1.980	0.781	0.906	16,700
1 7/16	2.075	2.075	0.850	0.906	18,000
1 ½	2.145	2.145	0.850	1.031	18,000
1 9/16	2.260	2.260	0.850	1.031	18,000
1 ⅝	2.325	2.325	1.000	1.031	18,000
1 11/16	2.400	2.400	1.000	1.156	18,000
1 ¾	2.510	2.510	1.093	1.156	18,000
1 3/16	2.575	2.575	1.125	1.156	18,000
1 ⅞	2.695	2.695	1.125	1.281	18,000
2	2.885	2.885	1.218	1.281	18,000
2 1/16	3.025	3.025	1.218	1.406	18,000
2 ⅛	3.075	3.075	1.218	1.406	18,000
2 3/16	3.150	3.150	1.375	1.515	18,000
2 ¼	3.260	3.260	1.375	1.515	18,000
2 5/16	3.300	3.300	1.375	1.531	18,000
2 ⅜	3.333	3.333	1.375	1.531	18,000

Table 4.1.5-4M Category 1, Type I Sockets, Single Hexagon and Double Hexagon, ¾ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, N·m
	Nut End, *C*	Drive End, *D*			
19	30.50	33.00	12.45	14.30	780
21	33.00	33.00	12.45	15.10	930
22	35.05	38.10	12.45	16.66	972
23	36.10	39.10	12.70	16.66	1 015
24	37.00	40.00	13.85	18.35	1 085
25	37.85	40.00	14.00	18.35	1 160
26	38.85	40.00	14.60	18.35	1 240
27	41.00	41.00	15.90	20.35	1 330
28	41.00	41.00	16.25	20.35	1 420
29	42.10	42.10	16.65	20.35	1 520
30	43.00	43.00	16.65	22.35	1 640
31	45.10	45.10	17.80	22.35	1 730
32	47.05	47.05	19.05	24.35	1 820
34	49.00	49.00	20.00	24.45	2 000
35	50.40	50.40	20.10	24.45	2 030
36	51.80	51.80	21.45	27.50	2 030
38	54.10	54.10	22.25	27.50	2 030
40	57.65	57.65	22.75	30.50	2 030
41	58.80	58.80	24.90	30.50	2 030
42	58.80	58.80	25.40	31.00	2 030
46	65.40	65.40	28.60	33.50	2 030
50	72.15	72.15	29.75	36.50	2 030
54	78.10	78.10	30.95	39.50	2 030
55	79.10	79.10	33.55	39.50	2 030
58	80.00	80.00	35.00	39.50	2 030
60	84.45	84.45	35.00	39.50	2 030

Table 4.1.5-5 Category 1, Type I Sockets, Single Hexagon and Double Hexagon, 1 in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*			
1 1/16	1.812	2.188	0.625	0.781	11,700
1 1/8	2.000	2.188	0.656	0.906	12,800
1 3/16	2.000	2.188	0.656	0.906	14,100
1 1/4	2.125	2.188	0.750	0.906	15,400
1 5/16	2.125	2.250	0.765	0.906	16,700
1 3/8	2.250	2.250	0.781	0.906	18,000
1 7/16	2.280	2.250	0.859	0.906	19,500
1 1/2	2.320	2.250	0.859	1.031	21,000
1 9/16	2.390	2.250	0.859	1.031	22,000
1 5/8	2.480	2.375	1.000	1.031	24,000
1 11/16	2.572	2.500	1.000	1.156	26,000
1 3/4	2.635	2.625	1.093	1.156	27,000
1 13/16	2.780	2.750	1.125	1.156	28,000
1 7/8	2.780	2.875	1.125	1.281	28,000
1 15/16	2.885	2.875	1.125	1.281	28,000
2	2.947	2.947	1.218	1.281	28,000
2 1/16	3.050	3.050	1.218	1.406	28,000
2 1/8	3.150	3.150	1.218	1.406	28,000
2 3/16	3.210	3.210	1.375	1.531	28,000
2 1/4	3.300	3.300	1.375	1.531	28,000
2 5/16	3.360	3.360	1.375	1.531	28,000
2 3/8	3.430	3.430	1.375	1.531	28,000
2 7/16	3.500	3.500	1.375	1.656	28,000
2 1/2	3.572	3.572	1.375	1.656	28,000
2 9/16	3.572	3.572	1.375	1.656	28,000
2 5/8	3.760	3.760	1.500	1.781	28,000
2 3/4	3.885	3.885	1.750	1.781	28,000
2 13/16	4.010	4.010	1.750	1.906	28,000
2 15/16	4.135	4.135	1.750	1.906	28,000
3	4.135	4.135	2.000	2.031	28,000
3 1/8	4.385	4.385	2.000	2.031	28,000
3 1/4	4.510	4.510	2.000	2.281	28,000
3 3/8	4.635	4.635	2.200	2.281	28,000
3 1/2	4.760	4.760	2.200	2.281	28,000
3 3/4	5.135	5.135	2.200	2.531	28,000
3 7/8	5.260	5.260	2.500	2.531	28,000
4	5.437	5.437	2.500	2.781	28,000
4 1/8	5.640	5.640	2.500	2.781	28,000
4 1/4	5.828	5.828	2.500	3.031	28,000
4 1/2	6.010	6.010	2.500	3.031	28,000

Table 4.1.5-5M Category 1, Type I Sockets, Single Hexagon and Double Hexagon, 1 in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, N·m
	Nut End, *C*	Drive End, *D*			
34	57.15	57.15	20.00	26.00	2 400
36	57.15	57.15	21.45	27.50	2 530
38	57.40	57.40	22.25	27.50	2 640
40	59.20	59.20	22.75	30.50	2 760
41	60.95	60.95	24.90	30.50	2 820
46	69.85	69.85	28.60	33.50	3 160
50	74.05	74.05	29.75	36.50	3 160
54	79.65	79.65	30.95	39.50	3 160
55	79.65	79.65	33.55	39.50	3 160
60	85.50	85.50	35.00	39.50	3 160
70	96.50	96.50	38.00	46.00	3 160
74	103.00	103.00	40.50	46.00	3 160

Table 4.1.5-6 Category 1, Type II Sockets, Square, 4-Point and 8-Point, ¼ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*			
3/16	0.433	0.510	0.093	0.125	125
1/4	0.510	0.510	0.125	0.141	200
5/16	0.572	0.572	0.140	0.172	300
3/8	0.696	0.696	0.156	0.281	550

Table 4.1.5-7 Category 1, Type II Sockets, Square, 4-Point and 8-Point, ⅜ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*			
1/4	0.572	0.690	0.125	0.141	250
5/16	0.625	0.690	0.140	0.172	400
3/8	0.739	0.937	0.156	0.281	900
7/16	0.833	1.000	0.218	0.281	1,250
1/2	0.942	1.135	0.265	0.344	1,450
9/16	1.051	1.135	0.328	0.406	1,600
5/8	1.130	1.250	0.375	0.469	2,000
11/16	1.190	1.310	0.375	0.469	2,000

Table 4.1.5-8 Category 1, Type II Sockets, Square, 4-Point and 8-Point, ½ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*			
3/8	0.739	0.947	0.156	0.281	1,600
7/16	0.833	1.010	0.218	0.281	1,700
1/2	0.942	1.135	0.265	0.344	2,000
9/16	1.051	1.135	0.328	0.406	2,700
5/8	1.130	1.260	0.375	0.469	3,600
11/16	1.225	1.322	0.375	0.469	4,300
3/4	1.317	1.385	0.437	0.531	5,000
13/16	1.440	1.447	0.453	0.594	5,000
7/8	1.523	1.572	0.500	0.656	5,000
15/16	1.650	1.650	0.546	0.656	5,000
1	1.760	1.760	0.546	0.656	5,000

Table 4.1.5-9 Category 1, Type III Sockets, Universal Joint, Single Hexagon and Double Hexagon, ¼ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*		
3/16	0.315	0.540	0.094	95
7/32	0.356	0.540	0.109	135
1/4	0.397	0.540	0.125	190
9/32	0.438	0.540	0.141	250
5/16	0.510	0.540	0.141	300
11/32	0.519	0.540	0.156	300
3/8	0.580	0.580	0.158	300
7/16	0.683	0.683	0.219	300
1/2	0.697	0.697	0.266	300
9/16	0.812	0.812	0.312	300

Table 4.1.5-9M Category 1, Type III Sockets, Universal Joint, Single Hexagon and Double Hexagon, ¼ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Proof Torque, N·m
	Nut End, *C*	Drive End, *D*		
3.2	6.00	14.30	1.60	7
4	7.00	14.30	2.40	8
5	8.30	14.30	2.70	10
5.5	9.00	14.30	2.80	14
6	9.80	14.30	3.05	16
6.3	10.00	14.30	3.20	21
7	10.95	14.30	3.55	27
8	12.25	14.30	3.55	34
9	13.45	14.30	4.05	34
10	15.25	15.60	4.60	34
11	17.20	17.20	5.45	34
12	17.60	17.60	6.10	34
13	18.00	18.00	6.75	34
14	18.90	19.00	8.05	34

Table 4.1.5-10 Category 1, Type III Sockets, Universal Joint, Single Hexagon and Double Hexagon, 3/8 in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*		
5/16	0.510	0.790	0.141	440
3/8	0.690	0.790	0.158	450
7/16	0.791	0.790	0.219	625
1/2	0.791	0.820	0.266	725
9/16	0.820	0.820	0.312	750
5/8	0.885	0.885	0.343	750
11/16	1.070	0.885	0.375	750
3/4	1.070	0.885	0.406	750
7/8	1.220	0.937	0.500	750

Table 4.1.5-10M Category 1, Type III Sockets, Universal Joint, Single Hexagon and Double Hexagon, 3/8 in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Proof Torque, N·m
	Nut End, *C*	Drive End, *D*		
7	11.00	20.00	3.55	29
8	12.30	20.00	3.55	37
9	14.00	20.00	4.05	52
10	18.05	20.05	4.60	57
11	19.00	20.05	5.45	69
12	19.05	20.05	6.10	77
13	19.25	20.80	6.75	82
14	19.95	20.80	8.35	84
15	22.40	21.56	8.35	85
16	23.87	22.50	9.55	85
17	24.40	22.50	9.55	85
18	26.14	22.50	10.15	85
19	27.00	22.50	11.10	85
20	28.20	22.85	11.50	85
21	29.45	23.25	11.70	85
22	30.70	23.70	12.40	85
24	33.10	25.00	13.50	85

Table 4.1.5-11 Category 1, Type III Sockets, Universal Joint, Single Hexagon and Double Hexagon, 1/2 in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Proof Torque, lbf-in.
	Nut End, *C*	Drive End, *D*		
1/2	0.773	1.010	0.266	1,000
9/16	0.854	1.010	0.312	1,350
5/8	0.947	1.010	0.345	1,500
11/16	1.046	1.060	0.375	1,750
3/4	1.105	1.150	0.437	1,750
13/16	1.197	1.150	0.453	1,750
7/8	1.273	1.150	0.500	1,750
15/16	1.400	1.150	0.500	1,750

Table 4.1.5-11M Category 1, Type III Sockets, Universal Joint, Single Hexagon and Double Hexagon, ½ in. Drive

Nominal Socket Opening	Maximum Outside Diameter		Minimum Opening Depth, *A*, Nut End	Minimum Proof Torque, N·m
	Nut End, *C*	Drive End, *D*		
12	18.70	25.65	6.10	96
13	20.00	25.65	6.75	120
14	21.35	25.65	8.35	145
15	22.70	25.65	8.35	160
16	24.20	25.70	9.55	170
17	25.60	26.25	9.55	190
18	27.00	27.20	10.15	200
19	27.95	28.45	11.10	200
20	29.30	28.60	11.50	200
21	30.80	28.60	11.70	200
22	32.05	28.60	12.45	200

4.1.6 Universal Joint Sockets (Category 1, Category 2, and Category 34). Universal joint sockets shall consist of a single- (6-point) or double-hexagon (12-point) socket and an internal drive end. Each member shall be permanently attached to each other or by means of an intermediate member to form a universal joint. The sockets shall be provided with a means to hold the drive end and socket end in any set position with a force adequate to hold the socket against gravity. For universal sockets with square block joints, angular deviation from the centerline is 40 deg minimum. For universal sockets with ball-swivel joints, angular deviation from the centerline is 20 deg minimum to 35 deg maximum. If hinge pins are used, they shall not extend beyond the periphery of the universal joint section by more than 0.031 in. (0.79 mm) and shall not interfere with the regular operation of the universal joint. The portion of the hinge pin that extends beyond the periphery shall not have sharp edges.

4.2 Design — Category 2

4.2.1 Type I and Type VII Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point) and Type II Sockets, Single Square (4-Point) and Double Square (8-Point). Sockets shall be similar to Figure 3-1 and shall conform to Table 4.2.1-1 (Table 4.2.1-1M) through Table 4.2.1-13.

4.2.2 Type III — Universal Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point). Type III universal sockets shall be similar to Figure 3-2 and comply with Table 4.2.2-1 (Table 4.2.2-1M) and Table 4.2.2-2 (Table 4.2.2-2M).

4.2.3 Type IV — Extension Bars. Extension bars shall have an external square drive at one end and an internal square drive of the same size at the other end. The extension bar shall be similar to Figure 4.2.3-1 and shall comply with Table 4.2.3-1.

4.2.4 Type V — Adapters. Adapters shall have an external square drive at one end with a different size and an internal square drive at the other end. Adapters shall be similar to Figure 4.2.4-1 and shall comply with Table 4.2.4-1.

4.2.5 Type VI — Universal Joints. Universal joints shall have an external square at one end and internal drive square of the same size at the other end. Each member shall be permanently attached to each other. Drive universal joints that are ¼ in., ⅜ in., and ½ in. shall be provided with a means to hold the drive end and external square end in any set position with a force adequate to hold the external square end against gravity. Type VI universal joints shall be similar to Figure 4.2.5-1 and comply with Table 4.2.5-1.

Table 4.2.1-1 Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), ¼ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
3/16	0.285	0.350	0.435	0.510	0.110	0.130	95
7/32	0.325	0.385	0.435	0.510	0.125	0.130	135
1/4	0.360	0.424	0.440	0.510	0.125	0.150	190
9/32	0.400	0.490	0.450	0.510	0.125	0.171	250
5/16	0.440	0.502	0.470	0.510	0.141	0.171	320
11/32	0.475	0.535	0.490	0.535	0.156	0.203	400
3/8	0.510	0.580	0.515	0.580	0.156	0.281	500
7/16	0.590	0.660	0.550	0.660	0.203	0.281	600
1/2	0.665	0.737	0.550	0.730	0.209	0.344	600
9/16	0.740	0.815	0.550	0.780	0.281	0.406	600

Table 4.2.1-1M Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), ¼ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, N·m
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
5	8.0	9.1	11.7	14.0	2.8	3.2	10
5.5	8.7	9.7	11.7	14.0	2.8	3.6	14
6	9.3	10.6	11.7	14.0	3.1	3.6	16
7	10.6	11.6	11.9	14.0	3.6	4.3	27
8	11.7	12.8	12.4	14.0	3.6	5.3	38
9	12.8	14.1	13.0	16.0	4.1	5.3	49
10	13.9	15.6	14.0	16.0	4.6	6.6	63
11	15.1	16.6	14.4	16.7	5.5	7.6	68
12	16.4	17.8	14.4	17.7	6.1	8.3	68
13	17.8	19.1	15.0	19.1	6.8	8.3	68
14	19.1	20.7	19.1	21.0	7.5	10.4	68
15	20.3	21.6	20.3	22.0	7.5	10.4	68

Table 4.2.1-2 Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 3/8 in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
5/16	0.471	0.515	0.677	0.760	0.141	0.171	440
11/32	0.490	0.552	0.677	0.760	0.156	0.203	550
3/8	0.527	0.605	0.677	0.760	0.156	0.281	660
7/16	0.613	0.697	0.677	0.760	0.203	0.281	930
1/2	0.693	0.823	0.700	0.823	0.209	0.344	1,240
9/16	0.771	0.885	0.771	0.885	0.249	0.406	1,610
5/8	0.860	0.948	0.860	0.948	0.281	0.469	2,000
11/16	0.860	1.031	0.865	1.031	0.318	0.469	2,200
3/4	1.021	1.073	0.865	1.073	0.356	0.531	2,200

Table 4.2.1-2M Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 3/8 in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, N·m
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
8	11.7	14.5	16.3	20.0	3.6	5.3	52
9	13.1	15.7	16.3	20.0	4.1	5.3	66
10	13.9	17.0	16.3	20.0	4.6	6.6	82
11	15.1	18.2	17.1	20.0	5.5	7.6	112
12	16.4	19.4	17.1	20.0	6.1	8.3	124
13	17.8	20.7	17.9	28.0	6.8	8.3	147
14	19.1	21.9	19.1	28.0	8.4	10.4	175
15	20.3	23.1	20.3	28.0	8.4	10.4	203
16	21.5	24.4	20.3	28.0	9.6	11.7	237
17	23.3	25.6	20.3	28.0	9.6	12.4	249
18	23.8	26.9	20.3	28.0	10.2	12.4	249
19	25.1	28.1	20.3	28.0	11.0	13.5	249
20	27.2	29.3	20.3	34.0	11.0	14.0	249
21	28.5	30.6	20.3	34.0	11.7	15.0	249
22	29.5	31.8	20.3	34.0	12.5	15.0	249
23	30.8	33.0	20.3	34.0	12.7	16.0	249
24	31.8	34.3	20.3	34.0	13.9	17.5	249

Table 4.2.1-3 Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), ½ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
3/8	0.550	0.715	0.850	1.135	0.156	0.281	1,100
7/16	0.638	0.806	0.850	1.135	0.203	0.281	1,500
1/2	0.726	0.897	0.850	1.135	0.209	0.344	2,000
9/16	0.814	0.987	0.850	1.135	0.249	0.406	2,600
5/8	0.902	1.070	0.850	1.135	0.281	0.469	3,300
11/16	0.990	1.169	0.990	1.197	0.318	0.469	4,100
3/4	1.062	1.260	1.004	1.260	0.356	0.531	5,000
13/16	1.135	1.325	1.019	1.335	0.418	0.594	5,000
7/8	1.207	1.390	1.033	1.410	0.479	0.594	5,000
15/16	1.280	1.455	1.048	1.485	0.490	0.656	5,000
1	1.352	1.521	1.062	1.560	0.490	0.656	5,000
1 1/16	1.425	1.586	1.077	1.635	0.490	0.687	5,000
1 1/8	1.497	1.651	1.091	1.710	0.632	0.781	5,000
1 3/16	1.570	1.716	1.105	1.785	0.632	0.796	5,000
1 1/4	1.642	1.781	1.120	1.860	0.632	0.812	5,000
1 5/16	1.789	2.197	1.120	1.906	0.748	0.906	5,000
1 3/8	1.861	2.197	1.120	1.906	0.748	0.937	5,000
1 7/16	1.933	2.322	1.120	2.031	0.748	1.000	5,000
1 1/2	2.005	2.387	1.120	2.156	0.847	1.062	5,000
1 9/16	2.075	2.445	1.120	2.250	0.847	1.062	5,000

Table 4.2.1-3M Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), ½ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, N·m
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
9	15.0	16.5	21.0	28.0	4.1	5.3	110
10	15.1	17.8	21.0	28.0	4.6	6.6	153
11	16.4	19.0	21.0	28.0	5.5	7.6	170
12	17.7	20.8	21.0	28.0	6.1	8.3	203
13	19.2	21.5	21.0	28.0	6.8	8.3	249
14	20.6	22.8	23.0	37.0	8.4	10.4	282
15	22.0	26.0	23.0	37.0	8.4	10.4	339
16	23.5	28.8	23.0	37.0	9.6	11.7	407
17	24.9	28.8	24.0	37.0	9.6	12.4	475
18	26.4	28.8	24.3	37.0	10.2	12.4	542
19	27.8	32.0	25.0	37.0	11.1	13.5	565
20	29.1	32.0	25.0	37.0	11.5	14.0	570
21	29.8	32.0	25.0	37.0	11.7	15.0	570
22	30.5	33.6	25.0	37.0	12.5	15.0	570
23	32.6	35.1	26.0	37.0	12.7	16.0	570
24	34.0	36.3	26.0	37.0	13.9	17.5	570
25	34.8	38.1	26.0	40.0	14.0	18.3	570
26	36.7	38.3	26.0	40.0	14.6	18.3	570
27	37.9	40.2	27.7	44.5	15.8	18.3	570
29	40.4	44.5	27.7	44.5	16.7	20.0	570
30	40.4	44.6	27.7	44.6	16.7	20.0	570
32	42.7	47.2	27.7	48.0	18.3	23.0	570
34	42.7	49.5	27.7	49.5	20.0	23.0	570
35	49.3	52.7	27.7	53.0	20.0	23.0	570
36	49.6	54.0	28.0	54.5	20.0	26.0	570

Table 4.2.1-4 Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), ¾ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
9/16	0.990	1.100	1.490	1.640	0.249	0.406	3,700
5/8	1.083	1.187	1.490	1.640	0.281	0.469	4,400
11/16	1.141	1.217	1.490	1.640	0.318	0.469	5,100
3/4	1.141	1.268	1.490	1.640	0.356	0.531	6,900
13/16	1.213	1.385	1.490	1.640	0.418	0.594	8,200
7/8	1.285	1.635	1.490	1.640	0.479	0.594	8,600
15/16	1.357	1.635	1.490	1.640	0.490	0.656	9,600
1	1.429	1.635	1.490	1.715	0.490	0.656	11,000
1 1/16	1.501	1.701	1.520	1.790	0.490	0.687	14,000
1 1/8	1.552	1.760	1.550	1.865	0.632	0.781	16,000
1 3/16	1.680	1.980	1.580	1.940	0.632	0.796	17,000
1 1/4	1.736	2.197	1.610	2.015	0.632	0.812	18,000
1 5/16	1.796	2.197	1.640	2.090	0.740	0.937	18,000
1 3/8	1.920	2.197	1.670	2.165	0.740	0.937	18,000
1 7/16	1.934	2.322	1.700	2.165	0.740	1.000	18,000
1 1/2	2.052	2.387	1.730	2.165	0.847	1.062	18,000
1 9/16	2.075	2.445	1.730	2.165	0.847	1.062	18,000
1 5/8	2.240	2.510	1.730	2.165	0.847	1.125	18,000
1 11/16	2.490	2.570	1.730	2.165	0.970	1.187	18,000
1 3/4	2.490	2.650	1.730	2.165	0.980	1.187	18,000
1 13/16	2.563	2.730	1.730	2.165	0.990	1.250	18,000
1 7/8	2.600	2.815	1.730	2.165	1.062	1.312	18,000
2	2.720	2.980	1.730	2.165	1.062	1.375	18,000
2 1/16	2.800	3.060	1.730	2.165	1.150	1.437	18,000
2 3/16	2.920	3.230	1.730	2.165	1.193	1.500	18,000
2 1/4	3.000	3.310	1.730	2.165	1.276	1.562	18,000
2 3/8	3.120	3.460	1.730	2.165	1.303	1.562	18,000

Table 4.2.1-4M Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), ¾ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, N·m
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
17	27.5	31.9	37.9	48.0	9.6	12.4	554
18	28.0	32.2	37.9	48.0	10.2	12.4	610
19	30.1	33.6	37.9	48.0	11.1	13.5	780
20	31.9	34.9	38.4	48.0	11.5	14.0	780
21	33.8	37.4	38.9	48.0	11.7	15.0	930
22	33.8	40.7	38.9	48.0	12.5	15.0	972
23	37.4	41.3	38.9	48.0	12.7	16.0	1 015
24	37.4	42.0	39.0	48.0	13.9	17.5	1 085
25	40.2	43.0	39.0	48.0	14.0	18.3	1 160
26	40.2	43.5	39.0	48.0	14.6	18.3	1 240
27	40.2	45.0	39.0	49.5	15.8	18.3	1 580
28	43.5	45.5	40.4	49.5	16.3	19.0	1 695
29	45.4	47.3	40.4	49.5	16.7	20.0	1 810
30	45.4	51.0	40.4	49.8	16.7	20.0	1 885
31	46.7	51.5	41.1	49.8	17.8	22.0	1 955
32	47.7	51.7	41.7	58.0	18.3	23.0	2 030
33	49.8	51.7	42.5	58.0	19.1	24.0	2 030
34	49.8	55.8	42.5	58.0	20.0	24.0	2 030
35	51.3	57.2	43.0	58.0	20.1	24.0	2 030
36	52.9	58.0	43.6	58.0	21.5	26.0	2 030
38	55.1	60.6	43.6	58.0	22.3	27.0	2 030
40	59.1	63.5	43.6	58.0	22.8	29.0	2 030
41	59.1	65.2	44.2	58.0	24.9	30.5	2 030
42	61.7	65.2	44.2	58.0	25.4	31.0	2 030
43	62.5	65.3	44.2	58.0	25.4	31.0	2 030
46	66.0	71.3	44.2	68.0	28.6	32.5	2 030
50	69.3	74.8	44.2	68.0	29.8	36.5	2 030

Table 4.2.1-5 Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 1 in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
3/4	1.281	1.448	1.990	2.135	0.356	0.531	8,000
13/16	1.365	1.510	1.990	2.135	0.418	0.594	10,000
7/8	1.417	1.544	1.990	2.135	0.479	0.594	11,000
15/16	1.480	1.607	1.990	2.135	0.490	0.656	13,000
1	1.490	1.763	1.990	2.135	0.490	0.656	14,000
1 1/16	1.521	1.763	1.990	2.197	0.490	0.687	15,000
1 1/8	1.552	1.823	1.990	2.197	0.632	0.781	17,300
1 3/16	1.680	1.980	1.990	2.197	0.632	0.796	19,700
1 1/4	1.736	2.197	1.990	2.197	0.632	0.812	22,000
1 5/16	1.828	2.260	1.990	2.197	0.740	0.937	22,000
1 3/8	1.920	2.322	1.990	2.322	0.740	0.937	22,000
1 7/16	2.012	2.397	1.990	2.397	0.740	1.000	24,000
1 1/2	2.104	2.473	1.990	2.473	0.847	1.062	24,000
1 9/16	2.196	2.548	1.990	2.548	0.847	1.062	26,000
1 5/8	2.288	2.623	1.990	2.623	0.847	1.125	26,000
1 11/16	2.379	2.699	1.990	2.699	0.970	1.187	28,000
1 3/4	2.471	2.774	1.990	2.774	0.980	1.187	28,000
1 13/16	2.563	2.849	2.240	2.849	0.990	1.250	30,000
1 7/8	2.655	2.925	2.240	2.925	1.062	1.312	30,000
1 15/16	2.747	3.000	2.240	3.000	1.062	1.312	30,000
2	2.839	3.073	2.240	3.073	1.062	1.375	32,000
2 1/16	2.931	3.073	2.240	3.073	1.169	1.437	32,000
2 1/8	3.023	3.166	2.240	3.166	1.169	1.500	32,000
2 3/16	3.115	3.260	2.365	3.260	1.193	1.500	32,000
2 1/4	3.240	3.385	2.365	3.385	1.276	1.562	32,000
2 5/16	3.302	3.447	2.365	3.447	1.276	1.562	32,000
2 3/8	3.365	3.510	2.365	3.510	1.303	1.562	32,000
2 7/16	3.490	3.640	2.365	3.640	1.353	1.687	32,000
2 1/2	3.490	3.640	2.365	3.640	1.353	1.750	32,000
2 9/16	3.615	3.760	2.365	3.760	1.380	1.750	32,000
2 5/8	3.615	3.760	2.365	3.760	1.460	1.812	32,000
2 11/16	3.677	3.885	2.365	3.885	1.460	1.875	32,000
2 3/4	3.740	4.010	2.365	4.010	1.490	1.875	32,000
2 13/16	3.990	4.100	2.365	4.100	1.567	1.937	32,000
2 7/8	3.990	4.100	2.365	4.100	1.567	1.937	32,000
2 15/16	3.990	4.135	2.365	4.135	1.600	1.937	32,000
3	4.115	4.260	2.365	4.260	1.675	2.125	32,000
3 1/8	4.115	4.385	2.365	4.385	1.708	2.125	32,000
3 1/4	4.180	4.572	2.365	4.572	1.708	2.312	32,000
3 3/8	4.240	4.760	2.365	4.760	1.870	2.375	32,000
3 1/2	4.740	5.040	2.365	5.040	1.911	2.375	32,000
3 5/8	4.750	5.050	2.365	5.050	2.000	2.560	32,000

Table 4.2.1-5 Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 1 in. Drive (Cont'd)

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
3⅞	4.900	5.365	2.365	5.365	2.150	2.625	32,000
4	5.120	5.520	2.365	5.520	2.200	2.850	32,000
4⅛	5.300	5.680	2.365	5.680	2.250	2.850	32,000
4¼	5.400	5.835	2.365	5.835	2.300	2.850	32,000
4½	5.600	6.150	2.365	6.150	2.400	3.090	32,000

Table 4.2.1-5M Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 1 in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, N·m
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
19	33.4	38.0	48.6	58.0	11.1	13.5	900
22	37.9	41.6	48.6	58.0	12.5	15.0	1 240
24	38.7	44.0	48.6	58.0	13.9	17.5	1 470
27	42.3	46.7	48.6	58.0	15.8	18.3	1 695
28	44.8	46.7	48.6	58.0	16.3	19.0	1 955
30	45.5	54.2	51.4	58.0	16.7	20.0	2 225
32	47.7	54.2	51.4	58.0	18.3	23.0	2 490
33	51.3	54.2	51.4	58.0	19.1	24.0	2 490
35	51.3	58.0	51.4	58.0	20.1	24.0	2 490
36	55.1	58.0	51.4	58.0	21.5	26.0	2 712
38	55.1	61.0	51.4	58.0	22.3	27.0	2 712
41	59.1	65.2	51.4	58.0	24.9	30.5	2 940
46	66.0	71.3	57.7	68.0	28.6	32.5	3 390
50	69.3	76.9	58.4	68.0	29.8	36.5	3 615
52	74.3	77.9	58.4	68.0	29.8	37.0	3 615
54	76.9	83.4	58.4	68.0	31.0	39.5	3 615
55	81.7	83.4	58.4	68.0	33.6	39.5	3 615
60	84.1	89.8	58.4	68.0	35.0	39.5	3 615
65	89.4	95.9	58.4	70.6	35.0	39.5	3 615
70	94.8	101.0	58.4	70.6	35.0	39.5	3 615

Table 4.2.1-6 Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 1½ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*
	Nut End, *C*		Drive End, *D*			
	Min.	Max.	Min.	Max.		
1 3/8	2.490	2.885	2.990	3.260	0.740	0.937
1 7/16	2.490	2.885	2.990	3.260	0.740	1.000
1 1/2	2.553	2.915	2.990	3.260	0.847	1.062
1 9/16	2.553	2.915	2.990	3.260	0.847	1.093
1 5/8	2.615	3.041	2.990	3.260	0.847	1.125
1 11/16	2.740	3.041	2.990	3.260	0.970	1.187
1 3/4	2.740	3.135	2.990	3.260	0.980	1.187
1 13/16	2.865	3.135	2.990	3.260	0.990	1.250
1 7/8	2.921	3.198	2.990	3.260	1.062	1.312
1 15/16	2.990	3.260	2.990	3.260	1.062	1.312
2	3.178	3.573	3.240	3.573	1.062	1.375
2 1/16	3.183	3.635	3.240	3.635	1.169	1.437
2 1/8	3.183	3.635	3.240	3.635	1.169	1.500
2 3/16	3.240	3.698	3.240	3.698	1.193	1.500
2 1/4	3.365	3.822	3.240	3.822	1.276	1.562
2 5/16	3.365	3.822	3.240	3.822	1.276	1.562
2 3/8	3.490	3.885	3.240	3.885	1.303	1.562
2 7/16	3.615	3.941	3.240	3.941	1.353	1.687
2 1/2	3.678	4.073	3.240	4.073	1.353	1.750
2 9/16	3.740	4.103	3.240	4.103	1.380	1.750
2 5/8	3.865	4.198	3.240	4.198	1.460	1.812
2 11/16	3.925	4.260	3.240	4.260	1.460	1.875
2 3/4	4.053	4.385	3.240	4.385	1.490	1.875
2 13/16	4.115	4.573	3.240	4.573	1.567	1.937
2 7/8	4.178	4.635	3.240	4.635	1.567	1.937
2 15/16	4.178	4.698	3.240	4.698	1.600	1.937
3	4.365	4.835	3.240	4.835	1.675	2.125
3 1/16	4.490	4.885	3.240	4.885	1.695	2.125
3 1/8	4.553	4.941	3.240	4.941	1.708	2.125
3 3/16	4.615	5.010	3.240	5.010	1.708	2.187
3 1/4	4.678	5.073	3.240	5.073	1.708	2.312
3 5/16	4.740	5.135	3.240	5.135	1.790	2.312
3 3/8	4.865	5.135	3.240	5.135	1.870	2.375
3 7/16	4.865	5.198	3.240	5.198	1.890	2.375
3 1/2	4.865	5.260	3.240	5.260	1.911	2.375
3 9/16	4.920	5.322	3.240	5.322	1.955	2.387
3 5/8	4.990	5.385	3.240	5.385	2.000	2.560
3 11/16	4.990	5.448	3.240	5.448	2.040	2.560
3 3/4	5.115	5.573	3.240	5.573	2.080	2.600
3 13/16	5.240	5.635	3.240	5.635	2.120	2.600
3 7/8	5.302	5.698	3.240	5.698	2.150	2.625
3 15/16	5.490	5.822	3.240	5.822	2.175	2.700

Table 4.2.1-6 Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 1½ in. Drive (Cont'd)

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*
	Nut End, *C*		Drive End, *D*			
	Min.	Max.	Min.	Max.		
4	5.490	5.885	3.240	5.885	2.200	2.850
4 1/16	5.553	5.941	3.240	5.941	2.225	2.850
4 1/8	5.740	6.073	3.240	6.073	2.250	2.850
4 3/16	5.740	6.103	3.240	6.103	2.275	2.875
4 1/4	5.802	6.135	3.240	6.135	2.300	2.875
4 5/16	5.865	6.322	3.240	6.322	2.325	3.000
4 3/8	5.921	6.322	3.240	6.322	2.350	3.000
4 7/16	5.990	6.395	3.240	6.395	2.375	3.000
4 1/2	6.115	6.573	3.240	6.573	2.400	3.090
4 5/8	6.302	6.573	3.240	6.573	2.425	3.125
4 3/4	6.365	6.635	3.240	6.635	2.450	3.290

Table 4.2.1-7 Category 2, Type I Sockets, Single Hexagon (6-Point), 2½ in. Drive

Nominal Opening	Outside Diameter		Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*
	Nut End, *C*	Drive End, *D*		
	Max.	Max.		
2 1/4	4.600	5.500	1.276	1.562
2 3/8	4.700	5.500	1.303	1.562
2 7/16	4.750	5.500	1.353	1.687
2 9/16	4.800	5.500	1.380	1.750
2 5/8	4.850	5.500	1.460	1.812
2 3/4	5.000	5.500	1.490	1.875
2 13/16	5.050	5.750	1.567	1.937
2 15/16	5.100	5.750	1.600	1.937
3	5.200	5.750	1.675	2.125
3 1/8	5.250	5.750	1.708	2.125
3 3/8	5.500	5.750	1.870	2.375
3 1/2	5.600	5.750	1.911	2.375
3 3/4	6.250	6.000	1.913	2.600
3 7/8	6.250	6.000	2.150	2.625
4 1/8	6.250	6.000	2.250	2.850
4 1/4	7.000	6.000	2.300	2.875
4 1/2	7.000	6.000	2.400	3.090
4 5/8	7.000	6.000	2.550	3.125
5	7.500	6.000	2.763	3.375
5 3/4	8.625	6.000	3.188	3.875
6 1/8	9.000	6.000	3.400	4.125

Table 4.2.1-8 Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), Thin Wall, ½ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
3/8	0.556	0.636	0.850	1.135	0.156	0.281	1,100
7/16	0.633	0.713	0.850	1.135	0.203	0.281	1,500
1/2	0.711	0.791	0.850	1.135	0.209	0.344	2,000
9/16	0.788	0.868	0.850	1.135	0.249	0.406	2,600
5/8	0.866	0.946	0.850	1.135	0.281	0.469	3,300
11/16	0.944	1.024	0.964	1.197	0.318	0.469	4,100
3/4	1.020	1.100	1.004	1.260	0.356	0.531	5,000
13/16	1.098	1.158	1.019	1.335	0.418	0.594	5,000
7/8	1.175	1.255	1.033	1.410	0.479	0.594	5,000
15/16	1.253	1.333	1.048	1.485	0.490	0.656	5,000
1	1.330	1.410	1.062	1.560	0.490	0.656	5,000
1 1/16	1.408	1.488	1.077	1.635	0.490	0.687	5,000
1 1/8	1.485	1.565	1.091	1.710	0.632	0.781	5,000
1 3/16	1.563	1.643	1.105	1.785	0.632	0.796	5,000
1 1/4	1.640	1.720	1.120	1.860	0.632	0.812	5,000
1 5/16	1.718	1.798	1.120	1.860	0.748	0.906	5,000
1 3/8	1.795	1.875	1.120	1.860	0.748	0.937	5,000
1 7/16	1.872	1.952	1.120	2.000	0.748	1.000	5,000
1 1/2	1.950	2.030	1.120	2.000	0.847	1.062	5,000
1 9/16	2.028	2.108	1.120	2.000	0.847	1.062	5,000

Table 4.2.1-9 Category 2, Type I Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), Thin Wall, 3/4 in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
1/2	0.801	0.940	1.490	1.635	0.209	0.344	3,000
9/16	0.990	1.010	1.490	1.635	0.249	0.406	3,700
5/8	1.003	1.187	1.490	1.635	0.281	0.469	4,400
11/16	1.141	1.187	1.490	1.635	0.318	0.469	5,100
3/4	1.141	1.260	1.490	1.640	0.356	0.531	6,000
13/16	1.213	1.385	1.490	1.640	0.418	0.594	6,800
7/8	1.285	1.635	1.490	1.640	0.479	0.594	7,700
15/16	1.357	1.635	1.490	1.640	0.490	0.656	8,700
1	1.429	1.635	1.490	1.715	0.490	0.656	9,700
1 1/16	1.501	1.701	1.520	1.790	0.490	0.687	10,800
1 1/8	1.573	1.760	1.520	1.865	0.632	0.781	11,900
1 3/16	1.645	1.980	1.520	1.940	0.632	0.796	13,000
1 1/4	1.717	2.197	1.520	2.015	0.632	0.812	14,200
1 5/16	1.789	2.197	1.520	2.090	0.740	0.937	15,400
1 3/8	1.861	2.197	1.520	2.165	0.740	0.937	16,700
1 7/16	1.933	2.322	1.520	2.165	0.740	1.000	18,000
1 1/2	2.005	2.387	1.520	2.165	0.847	1.062	18,000
1 9/16	2.028	2.445	1.545	2.165	0.847	1.062	18,000
1 5/8	2.145	2.510	1.578	2.165	0.847	1.125	18,000
1 11/16	2.245	2.510	1.578	2.165	0.970	1.187	18,000
1 3/4	2.325	2.510	1.578	2.165	0.980	1.187	18,000
1 13/16	2.400	2.560	1.578	2.165	0.990	1.250	18,000
1 7/8	2.490	2.640	1.578	2.165	1.062	1.312	18,000
2	2.650	2.800	1.578	2.165	1.062	1.375	18,000
2 1/16	2.730	2.880	1.578	2.165	1.150	1.437	18,000
2 3/16	2.895	3.050	1.578	2.165	1.193	1.500	18,000
2 1/4	3.000	3.125	1.578	2.165	1.276	1.562	18,000
2 3/8	3.140	3.290	1.578	2.165	1.303	1.562	18,000

Table 4.2.1-10 Category 2, Type II Sockets, Single Square (4-Point) and Double Square (8-Point), 3/8 in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
1/4	0.466	0.491	0.677	0.697	0.125	0.156	270
5/16	0.559	0.666	0.677	0.760	0.141	0.171	440
3/8	0.637	0.760	0.677	0.760	0.156	0.281	660
7/16	0.740	0.854	0.740	0.854	0.203	0.281	930
1/2	0.865	0.948	0.865	0.948	0.209	0.343	1,240
9/16	0.950	1.041	0.950	1.041	0.249	0.406	1,600
5/8	1.052	1.138	1.052	1.138	0.281	0.469	2,000
11/16	1.115	1.198	1.115	1.198	0.318	0.469	2,200

Table 4.2.1-11 Category 2, Type II Sockets, Single Square (4-Point) and Double Square (8-Point), 1/2 in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
3/8	0.697	0.760	0.865	1.010	0.156	0.281	1,100
7/16	0.802	0.860	0.927	1.010	0.203	0.281	1,500
1/2	0.898	0.978	0.927	1.041	0.209	0.344	2,000
9/16	0.990	1.041	0.990	1.138	0.249	0.406	2,600
5/8	1.099	1.166	1.104	1.197	0.281	0.469	3,300
11/16	1.178	1.260	1.178	1.260	0.318	0.469	4,100
3/4	1.302	1.343	1.115	1.385	0.356	0.531	5,000
13/16	1.365	1.447	1.115	1.447	0.418	0.594	5,000
7/8	1.490	1.573	1.245	1.572	0.479	0.594	5,000
15/16	1.601	1.666	1.302	1.697	0.490	0.656	5,000
1	1.678	1.760	1.302	1.760	0.490	0.656	5,000
1 1/16	1.823	1.843	1.302	1.843	0.490	0.687	5,000

Table 4.2.1-12 Category 2, Type II Sockets, Single Square (4-Point) and Double Square (8-Point), ¾ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
1/2	0.990	1.073	1.490	1.635	0.209	0.344	3,000
9/16	1.146	1.166	1.490	1.635	0.249	0.406	3,700
5/8	1.235	1.260	1.490	1.635	0.281	0.469	4,400
11/16	1.330	1.355	1.490	1.635	0.318	0.469	5,100
3/4	1.490	1.635	1.490	1.635	0.356	0.531	6,900
13/16	1.615	1.698	1.600	1.760	0.418	0.594	8,200
7/8	1.740	1.760	1.615	1.826	0.479	0.594	8,600
15/16	1.802	1.826	1.615	1.826	0.490	0.656	9,600
1	1.927	2.135	1.615	2.135	0.490	0.656	11,000
1 1/16	1.990	2.135	1.740	2.135	0.490	0.687	14,000
1 1/8	2.115	2.322	1.740	2.322	0.632	0.781	16,000
1 1/4	2.365	2.447	1.740	2.447	0.632	0.812	18,000
1 5/16	2.490	2.697	1.740	2.697	0.740	0.937	18,000
1 7/16	2.615	2.697	1.740	2.697	0.740	1.000	18,000
1 1/2	2.740	2.823	1.740	2.823	0.847	1.062	18,000

Table 4.2.1-13 Category 2, Type VII Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), #5 Spline Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*				
	Min.	Max.	Min.	Max.			
3/4	1.281	1.448	2.365	2.406	0.356	0.531	6,400
13/16	1.365	1.510	2.365	2.406	0.418	0.594	7,400
7/8	1.417	1.544	2.365	2.406	0.479	0.594	8,400
15/16	1.480	1.607	2.365	2.406	0.490	0.656	9,400
1	1.490	1.763	2.365	2.406	0.490	0.656	10,500
1 1/16	1.521	1.763	2.365	2.406	0.490	0.687	11,700
1 1/8	1.552	1.823	2.365	2.406	0.632	0.781	12,800
1 1/4	1.736	2.197	2.365	2.406	0.632	0.812	15,400
1 5/16	1.828	2.380	2.365	2.406	0.740	0.937	16,700
1 3/8	1.920	2.450	2.365	2.406	0.740	0.937	18,000
1 7/16	2.012	2.600	2.365	2.406	0.740	1.000	19,500
1 1/2	2.104	2.645	2.365	2.473	0.847	1.062	21,000
1 5/8	2.288	2.800	2.365	2.510	0.847	1.125	24,000
1 11/16	2.379	2.900	2.365	2.635	0.970	1.187	26,000
1 13/16	2.563	3.020	2.365	2.822	0.990	1.250	29,000
1 7/8	2.655	3.020	2.365	2.822	1.062	1.312	31,000
2	2.839	3.150	2.365	3.073	1.062	1.375	34,000
2 1/16	2.931	3.220	2.365	3.073	1.169	1.437	36,000
2 3/16	3.115	3.365	2.365	3.260	1.193	1.500	40,000
2 1/4	3.240	3.440	2.365	3.260	1.276	1.562	42,000
2 3/8	3.365	3.585	2.365	3.385	1.303	1.562	46,000
2 7/16	3.490	3.655	2.365	3.510	1.353	1.687	48,000
2 1/2	3.490	3.730	2.365	3.510	1.353	1.750	48,000
2 9/16	3.615	3.800	2.365	3.635	1.380	1.750	48,000
2 5/8	3.615	3.875	2.365	3.760	1.460	1.812	48,000
2 3/4	3.740	4.050	2.365	4.010	1.490	1.875	48,000
2 13/16	3.990	4.100	2.365	4.135	1.567	1.937	48,000
2 15/16	3.990	4.240	2.365	4.135	1.600	1.937	48,000
3	4.115	4.310	2.365	4.260	1.675	2.125	48,000
3 1/8	4.115	4.455	2.365	4.260	1.708	2.125	48,000
3 3/8	4.240	4.760	2.365	4.635	1.870	2.375	48,000
3 1/2	4.740	4.760	2.365	4.760	1.911	2.375	48,000

Table 4.2.2-1 Category 2, Type III Universal Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 3/8 in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Bolt Clearance Hole Depth	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*					
	Min.	Max.	Min.	Max.				
3/8	0.520	0.760	0.677	0.910	0.156	0.281	0.234	450
7/16	0.607	0.760	0.677	0.910	0.203	0.281	0.305	625
1/2	0.677	0.823	0.677	0.910	0.209	0.344	0.314	725
9/16	0.740	0.850	0.677	0.910	0.249	0.406	0.374	750
5/8	0.855	0.948	0.730	0.910	0.281	0.469	0.422	750
11/16	0.970	1.010	0.730	0.910	0.318	0.469	0.477	750
3/4	1.030	1.135	0.730	0.910	0.356	0.531	0.534	750

Table 4.2.2-1M Category 2, Type III Universal Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), 3/8 in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Bolt Clearance Hole Depth	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	7.0	5.3	37
9	13.8	15.3	20.0	24.4	4.05	7.0	6.1	52
10	15.0	19.3	20.0	24.4	4.60	8.0	6.9	57
11	16.2	19.3	20.0	24.4	5.45	8.5	8.2	69
12	17.4	19.3	20.0	24.4	6.10	8.5	9.2	77
13	18.6	20.9	20.0	28.0	6.75	9.0	10.1	82
14	19.8	22.5	20.0	28.0	7.00	10.0	10.5	84
15	20.7	22.9	20.0	28.0	7.00	10.5	10.5	85
16	22.2	24.1	20.0	28.0	8.00	11.5	12.0	85
17	23.1	25.7	20.0	28.0	8.00	11.5	12.0	85
18	24.6	26.7	20.0	28.0	9.00	12.0	13.5	85
19	25.8	28.8	20.0	28.0	9.00	13.0	13.5	85
20	26.5	29.4	22.7	28.0	11.50	13.0	17.3	85
21	27.5	30.2	22.7	28.0	11.70	13.0	17.6	85
22	29.0	31.8	22.7	28.0	12.00	13.0	18.0	85
23	30.0	33.3	22.7	28.0	12.70	13.0	19.1	85
24	31.0	34.9	22.7	28.0	13.85	13.0	20.8	85

Table 4.2.2-2 Category 2, Type III Universal Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), ½ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Bolt Clearance Hole Depth	Minimum Proof Torque, lbf-in.
	Nut End, *C*		Drive End, *D*					
	Min.	Max.	Min.	Max.				
7/16	0.600	0.814	0.865	1.063	0.203	0.281	0.305	850
1/2	0.681	0.891	0.865	1.063	0.209	0.344	0.314	1,000
9/16	0.763	0.968	0.865	1.063	0.249	0.406	0.374	1,350
5/8	0.844	1.046	0.865	1.063	0.281	0.469	0.422	1,500
11/16	0.926	1.123	0.927	1.250	0.318	0.469	0.477	1,750
3/4	1.001	1.260	0.927	1.250	0.356	0.531	0.534	1,750
13/16	1.009	1.278	0.927	1.250	0.418	0.594	0.627	1,750
7/8	1.178	1.355	0.927	1.250	0.479	0.594	0.719	1,750
15/16	1.252	1.433	0.927	1.250	0.490	0.656	0.735	1,750
1	1.333	1.510	0.927	1.250	0.490	0.656	0.735	1,750
1 1/16	1.364	1.515	0.927	1.250	0.490	0.687	0.735	1,750
1 1/8	1.439	1.590	0.927	1.250	0.632	0.781	0.948	1,750
1 3/16	1.514	1.665	0.927	1.250	0.632	0.796	0.948	1,750
1 1/4	1.588	1.740	0.927	1.250	0.632	0.812	0.948	1,750
1 5/16	1.663	1.815	0.927	1.250	0.748	0.906	1.122	1,750

Table 4.2.2-2M Category 2, Type III Universal Sockets, Single Hexagon (6-Point) and Double Hexagon (12-Point), ½ in. Drive

Nominal Opening	Outside Diameter				Minimum Nut Opening Depth, *A*	Minimum Bolt Clearance Hole Diameter, *B*	Minimum Bolt Clearance Hole Depth	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	8.0	6.9	57
11	16.5	20.7	22.5	28.0	5.45	8.5	8.2	69
12	18.0	21.7	22.5	28.0	6.10	8.5	9.2	96
13	19.5	22.6	22.5	28.0	6.75	9.0	10.1	120
14	21.1	24.6	22.5	37.0	8.00	10.0	12.0	145
15	22.5	25.4	23.7	37.0	8.00	10.5	12.0	160
16	23.8	26.6	25.6	37.0	8.50	11.5	12.8	170
17	25.3	27.9	27.5	37.0	9.00	11.5	13.5	190
18	26.6	30.1	28.5	37.0	9.50	12.0	14.3	200
19	28.0	32.0	28.5	37.0	10.50	13.0	15.8	200
21	30.4	32.9	28.5	37.0	11.70	13.0	17.6	200
22	31.6	34.4	28.5	37.0	12.45	13.0	18.7	200
24	34.3	36.4	28.7	37.0	13.85	13.0	20.8	200

Figure 4.2.3-1 Category 2, Type IV, Bar Extension

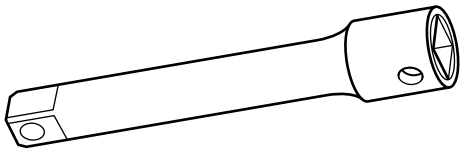


Table 4.2.3-1 Category 2, Type IV, Bar Extension

Drive Size	Maximum Shank Diameter	Minimum Torque, lbf-in.
1/4	0.380	500
3/8	0.510	1,200
1/2	0.700	3,500
3/4	1.313	9,000
1	1.563	15,000

Figure 4.2.4-1 Category 2, Type V, Adapter

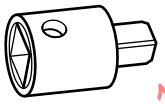


Table 4.2.3-2 Length Ranges for Category 2, Type IV, Bar Extension

		Overall Length	
Drive Size	Nominal Length	Min.	Max.
1/4	2	1.750	2.500
1/4	4	3.750	4.500
1/4	6	5.750	6.500
3/8	3	2.500	3.500
3/8	6	5.500	6.500
3/8	12	11.500	12.500
1/2	3	2.500	3.500
1/2	5	4.500	6.000
1/2	6	5.500	6.500
1/2	10	9.500	10.500
3/4	3	2.500	3.500
3/4	7	6.500	7.500
3/4	10	9.500	10.500
3/4	13	12.500	13.500
1	3	2.500	3.500
1	7	5.500	7.500
1	13	11.500	13.500

Table 4.2.4-1 Category 2, Type V, Adapters

External Drive Size	Internal Drive Size	Maximum Overall Length	Maximum Outside Diameter	Minimum Torque, lbf-in.
3/8	1/4	1.000	0.625	450
1/4	3/8	1.125	0.687	450
3/8	1/2	1.625	1.188	2,000
1/2	3/8	1.563	1.063	2,000
1/2	5/8	1.906	1.375	3,500
1/2	3/4	2.270	1.688	4,500
5/8	1/2	1.813	1.375	4,500
5/8	3/4	2.270	1.688	4,500
3/4	1/2	2.031	1.375	4,500
3/4	5/8	2.031	1.563	9,000
3/4	1	3.060	2.250	14,000
1	3/4	2.688	2.063	14,000

Figure 4.2.5-1 Category 2, Type VI, Universal Joints

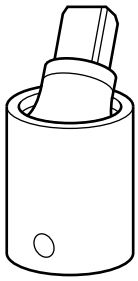


Table 4.2.5-1 Category 2, Type VI, Universal Joint

External and Internal Drive End Size	Maximum Overall Length	Maximum Outside Diameter	Minimum Proof Torque, lbf-in.
1/4	1.688	0.625	250
3/8	2.500	1.000	1,000
1/2	3.063	1.500	2,800
5/8	3.500	1.500	5,000
3/4	4.250	2.000	7,000
1	6.100	2.750	10,000

Table 4.2.5-2 Length Classes for ¼ in. Drive Socket Wrenches

Nominal Opening	Category 1						Category 2	
	Type I				Type II	Type III	Type I	
		Long		Extra Long,				
	Regular, Max.	Min.	Max.	Min.	Regular, Max.	Regular, Max.	Regular, Max.	Long, Min.
1/8	1.010	1.020	1.920	1.930	...	...	...	...
5/32	1.010	1.020	1.920	1.930	...	...	...	...
3/16	1.010	1.020	1.920	1.930	...	1.360	1.010	1.900
7/32	1.010	1.020	1.920	1.930	1.000	1.360	1.010	1.900
1/4	1.010	1.020	1.920	1.930	1.000	1.420	1.010	1.900
9/32	1.010	1.020	1.920	1.930	...	1.420	1.010	1.900
5/16	1.010	1.020	1.920	1.930	1.000	1.520	1.010	1.900
11/32	1.010	1.020	1.920	1.930	...	1.520	1.010	1.900
3/8	1.010	1.020	1.920	1.930	1.000	1.580	1.010	1.900
13/32	1.010	1.020	1.920	1.930	...	...	...	1.900
7/16	1.010	1.020	1.920	1.930	...	1.640	1.010	1.900
1/2	1.010	1.020	1.920	1.930	...	1.697	1.010	1.900
9/16	1.010	1.020	1.920	1.930	...	1.791	1.010	1.900

Table 4.2.5-3 Length Classes for 3/8 in. Drive Socket Wrenches

	Category 1						Category 2								
	Type I				Type II	Type III	Type I				Type II, 4-Point	Type II, 8-Point		Type III	
Nominal Opening	Regular, Max.	Long Min.	Long Max.	Extra Long, Min.	Regular, Max.	Regular, Max.	Regular, Max.	Long Min.	Long Max.	Extra Long, Min.	Regular, Max.	Regular, Max.	Long, Min.	Regular, Max.	Long, Min.
1/4	1.260	1.270	1.740	1.750	1.250	...	...	...	...	...	1.000	1.000	1.437	...	...
9/32	1.260	1.270	1.740	1.750	...	...	...	...	...	...	...	...	...	...	...
5/16	1.260	1.270	1.740	1.750	1.250	1.813	1.187	1.688	2.500	...	1.000	1.000	1.437	...	...
11/32	1.260	1.270	1.740	1.750	...	...	1.187	1.688	2.500	...	...	...	...	...	...
3/8	1.260	1.270	1.740	1.750	1.250	2.000	1.187	1.688	2.500	2.688	1.000	1.000	1.437	2.500	2.750
7/16	1.260	1.270	1.740	1.750	1.250	2.125	1.187	1.688	2.500	2.688	...	1.063	1.437	2.500	2.750
1/2	1.260	1.270	1.740	1.750	1.250	2.187	1.187	1.688	2.500	2.688	...	1.063	1.562	2.500	2.750
9/16	1.260	1.270	1.865	1.875	1.250	2.250	1.250	1.938	2.750	3.250	...	1.140	1.562	2.500	2.750
9/32	1.260	1.270	1.928	1.938	...	...	...	...	...	...	...	...	...	...	...
5/8	1.260	1.270	1.990	2.000	1.250	2.250	1.250	1.938	2.750	...	...	1.290	...	2.500	2.750
11/16	1.260	1.270	2.115	2.125	1.250	2.250	1.250	1.938	2.750	...	...	1.290	...	2.650	3.250
3/4	1.260	1.270	2.115	2.125	...	2.312	1.250	1.938	2.750	...	...	...	...	2.650	3.250
13/16	1.406	1.416	2.470	2.480	...	...	...	...	...	...	...	...	...	...	...
7/8	1.406	1.416	2.470	2.480	...	2.375	...	...	...	...	...	...	...	...	...
15/16	1.650	1.660	2.470	2.480	...	...	...	...	...	...	...	...	...	..	...
1	1.650	1.660	2.470	2.480	...	...	...	...	...	...	...	...	...	..	...

Table 4.2.5-4 Length Classes for ½ in. Drive Socket Wrenches

	Category 1						Category 2										
	Type I				Type II	Type III	Type I				Type I Thinwall		Type II, 4-Point	Type II, 8-Point		Type III	
		Long		Extra Long,				Long		Extra Long,							
Nominal Opening	Regular, Max.	Min.	Max.	Min.	Regular, Max.	Regular, Max.	Regular, Max.	Min.	Max.	Min.	Regular, Max.	Long, Min.	Long, Min.	Regular, Max.	Long, Min.	Regular, Max.	Long, Min.
3/8	1.525	1.520	2.990	3.000	1.562	...	1.800	3.187	3.688	...	2.000	3.187	3.187	1.800	3.187	...	...
7/16	1.525	1.520	2.990	3.000	1.562	...	1.800	3.187	3.688	...	2.000	3.187	3.187	1.800	3.187	3.000	3.500
1/2	1.525	1.520	2.990	3.000	1.562	2.550	1.800	3.187	3.688	4.938	2.000	3.187	3.187	1.800	3.187	3.000	3.500
9/16	1.572	1.582	2.990	3.000	1.562	2.740	1.800	3.187	3.688	4.938	2.000	3.187	3.187	1.800	3.187	3.000	3.500
19/32	1.572	1.582	2.990	3.000	...	...	...	...	...	...	...	...	...	...	...	...	...
5/8	1.572	1.582	2.990	3.000	1.750	2.740	1.800	3.187	3.688	4.938	2.000	3.187	...	1.800	3.187	3.000	3.500
11/16	1.572	1.582	2.990	3.000	1.750	2.840	1.800	3.187	3.688	4.938	2.000	3.187	...	1.800	3.187	3.000	3.500
3/4	1.572	1.582	2.990	3.000	1.750	3.105	1.800	3.187	3.688	4.938	2.000	3.187	...	1.800	3.187	3.000	3.500
13/16	1.635	1.645	2.990	3.000	1.750	3.167	1.812	3.187	3.688	4.938	2.000	3.187	...	1.800	3.187	3.000	3.500
7/8	1.760	1.770	2.990	3.000	1.875	3.167	1.960	3.187	3.688	4.938	2.000	3.187	...	1.800	3.187	3.000	3.500
15/16	1.760	1.770	2.990	3.000	1.875	3.200	2.100	3.187	3.688	4.938	2.000	3.187	...	2.100	3.437	3.250	3.750
1	1.760	1.770	2.990	3.000	2.000	...	2.100	3.187	3.688	4.938	2.500	3.187	...	2.100	3.437	3.250	3.750
1 1/16	1.853	1.863	2.990	3.000	...	...	2.410	3.187	3.688	4.938	2.500	3.187	...	2.100	...	3.500	3.750
1 1/8	1.947	1.957	2.990	3.000	...	...	2.410	3.187	3.688	4.938	2.500	3.187	...	...	...	3.500	3.750
1 3/16	1.947	1.957	2.990	3.000	...	...	...	...	...	...	2.500	3.187	...	...	...	3.500	3.750
1 1/4	2.015	2.025	2.990	3.000	...	...	2.410	3.187	3.688	...	2.500	3.187	...	...	...	3.500	3.750
1 5/16	2.015	2.025	2.990	3.000	...	...	2.500	3.187	3.688	...	2.500	3.187	...	...	...	3.500	3.750
1 3/8	2.155	2.145	2.990	3.000	...	...	2.500	3.187	3.688	...	2.500	3.187	...	...	...	...	...
1 7/16	2.295	2.285	2.990	3.000	...	...	2.500	3.187	3.688	...	2.500	3.187	...	...	...	...	...
1 1/2	2.295	2.285	2.990	3.000	...	...	2.500	3.187	3.688	...	2.500	3.187	...	...	...	...	...
1 9/16	...	...	...	...	...	...	2.500	3.187	3.688	...	2.500	3.187	...	...	...	...	...

Table 4.2.5-5 Length Classes for 3/4 in. Drive Socket Wrenches

	Category 1		Category 2						
	Type I		Type I		Type I Thinwall	Type II			
						4-Point		8-Point	
Nominal Opening	Regular, Max.	Long, Min.	Regular, Max.	Long, Min.	Long, Min.	Regular, Max.	Long, Min.	Regular, Max.	Long, Min.
1/2	...	...	...	...	2.125	2.250	2.937	2.250	2.937
9/16	...	...	2.125	2.937	2.125	2.250	2.937	2.250	2.937
5/8	...	...	2.125	2.937	2.125	2.250	2.937	2.250	2.937
11/16	...	...	2.125	2.937	2.125	2.250	2.937	2.250	2.937
3/4	2.300	3.250	2.125	2.937	2.125	2.313	2.937	2.313	2.937
13/16	2.300	3.250	2.250	2.937	2.250	2.438	2.937	2.438	2.937
7/8	2.300	3.250	2.250	2.937	2.250	...	...	2.438	2.937
15/16	2.300	3.250	2.375	2.937	2.375	...	...	2.438	2.937
1	2.300	3.250	2.375	2.937	2.375	...	...	2.594	2.937
1 1/16	2.300	3.346	2.500	2.937	2.500	...	...	2.594	2.937
1 1/8	2.350	3.346	2.500	2.937	2.500	...	...	2.750	2.937
1 3/16	2.350	3.346	2.625	3.187	2.500	...	...	...	...
1 1/4	2.400	3.346	2.625	3.187	2.625	...	...	2.750	2.937
1 5/16	2.700	3.346	2.750	3.187	2.625	...	...	2.750	2.937
1 3/8	2.700	3.346	2.750	3.187	2.750	...	...	...	...
1 7/16	2.700	3.346	2.750	3.187	2.750	...	...	2.750	...
1 1/2	2.700	3.346	2.750	3.437	2.750	...	...	2.750	...
1 9/16	2.760	3.346	2.750	3.437	2.750	...	...	...	...
1 5/8	2.750	3.379	2.750	3.437	2.750	...	...	...	...
1 11/16	3.200	3.379	2.875	3.437	2.875	...	...	...	...
1 3/4	3.200	3.437	2.875	3.437	2.875	...	...	...	...
1 13/16	3.260	3.437	3.062	3.437	3.062	...	...	...	...
1 7/8	3.385	3.437	3.062	3.437	3.062	...	...	...	...
2	3.510	3.500	3.250	3.687	3.250	...	...	...	...
2 1/16	3.697	3.500	3.250	3.687	3.250	...	...	...	...
2 1/8	3.697	3.500	...	...	...	...	...	...	...
2 3/16	3.760	3.500	3.500	3.937	3.500	...	...	...	...
2 1/4	3.885	3.500	3.500	3.937	3.500	...	...	...	...
2 5/16	3.947	3.500	...	...	...	...	...	...	...
2 3/8	4.010	3.500	3.625	4.062	3.625	...	...	...	...

Table 4.2.5-6 Length Classes for 1, 1½, 2½ in. and #5 Spline Drive Socket Wrenches

	Category 1	Category 2						
	Type I	Type I					Type VII	
	1 in. Drive	1 in. Drive		1½ in. Drive		2½ in. Drive	#5 Spline	
Nominal Opening	Regular, Max.	Regular, Max.	Long, Min.	Regular, Max.	Long, Min.	Regular, Max.	Regular, Max.	Long, Min.
¾	...	2.438	2.937	...	...	...	3.094	3.187
13/16	...	2.500	2.937	...	...	...	3.094	3.187
⅞	...	2.500	2.937	...	...	...	3.094	3.187
15/16	...	2.563	2.937	...	...	...	3.094	3.187
1	...	2.563	2.937	...	...	...	3.094	3.187
1 1/16	3.010	2.687	2.937	...	...	...	3.094	3.187
1 1/8	3.010	2.687	2.937	...	...	...	3.094	3.187
1 3/16	3.010	2.750	2.937	...	...	...	...	...
1 1/4	3.010	2.750	2.937	...	...	...	3.094	3.187
1 5/16	3.010	2.875	3.187	...	...	...	3.094	3.187
1 3/8	3.010	2.938	3.187	3.250	4.000	...	3.094	3.187
1 7/16	3.010	2.938	3.187	3.250	4.000	...	3.094	3.187
1 1/2	3.072	3.000	3.437	3.250	4.000	...	3.094	3.437
1 9/16	3.135	3.063	3.437	3.250	4.000	...	...	...
1 5/8	3.260	3.063	3.437	3.250	4.000	...	3.094	3.437
1 11/16	3.260	3.250	3.437	3.250	4.000	...	3.250	3.437
1 3/4	3.260	3.250	3.437	3.375	4.250	...	...	...
1 13/16	3.385	3.250	3.437	3.375	4.250	...	3.250	3.437
1 7/8	3.385	3.250	3.437	3.656	4.375	...	3.250	3.437
1 15/16	3.385	3.375	3.625	3.656	4.375	...	...	...
2	3.510	3.438	3.687	3.812	4.500	...	3.438	3.687
2 1/16	3.510	3.600	3.687	3.812	4.500	...	3.500	3.687
2 1/8	3.635	3.563	3.937	3.938	4.750	...	...	...
2 3/16	3.760	3.563	3.937	3.938	4.750	...	3.563	3.937
2 1/4	3.885	3.625	3.937	4.125	5.000	5.500	3.760	3.937
2 5/16	3.947	3.688	4.000	4.125	5.000	...	3.760	3.937
2 3/8	4.010	3.760	4.062	4.188	5.000	5.500	3.760	4.062
2 7/16	4.135	3.875	4.325	4.188	5.000	5.500	3.875	4.325
2 1/2	4.385	3.937	4.325	4.188	5.000	...	3.937	4.325
2 9/16	4.447	4.000	4.325	4.188	5.000	5.500	4.000	4.325
2 5/8	4.635	4.000	4.625	4.312	5.125	5.500	4.060	4.625
2 11/16	...	4.125	4.625	4.312	5.125	...	...	...
2 3/4	4.885	4.250	4.625	4.500	5.250	5.750	4.250	4.625
2 13/16	4.885	4.375	4.812	4.500	5.250	5.750	4.375	4.812
2 7/8	...	4.500	4.812	4.625	5.375	...	...	...
2 15/16	4.885	4.625	4.812	4.625	5.375	5.750	4.625	4.812
3	5.010	4.625	5.062	4.800	5.625	5.750	4.625	5.062
3 1/16	...	...	...	4.800	5.625	...	...	...

Table 4.2.5-6 Length Classes for 1, 1½, 2½ in. and #5 Spline Drive Socket Wrenches (Cont'd)

	Category 1	Category 2						
	Type I	Type I					Type VII	
	1 in. Drive	1 in. Drive		1½ in. Drive		2½ in. Drive	#5 Spline	
Nominal Opening	Regular, Max.	Regular, Max.	Long, Min.	Regular, Max.	Long, Min.	Regular, Max.	Regular, Max.	Long, Min.
3 1/8	5.010	4.750	5.062	4.800	5.625	5.750	4.750	5.062
3 3/16	...	...	...	4.800	5.625	...	...	...
3 1/4	5.010	4.750	5.250	5.063	5.750	...	...	...
3 5/16	...	...	...	5.063	5.750	...	...	...
3 3/8	5.010	4.750	5.437	5.063	5.750	5.750	4.750	5.437
3 7/16	...	...	...	5.063	5.750	...	...	...
3 1/2	5.010	5.375	5.437	5.188	5.875	5.750	5.375	5.437
3 9/16	...	...	...	5.188	5.875	...	...	...
3 5/8	...	5.375	5.437	5.132	6.125	...	...	...
3 11/16	...	...	...	5.132	6.125	...	...	...
3 3/4	5.010	...	...	5.625	6.500	6.250	...	...
3 13/16	...	...	...	5.625	6.500	...	...	...
3 7/8	5.010	5.375	5.437	5.750	6.750	6.250	...	...
3 15/16	...	...	...	5.875	6.875	...	...	...
4	6.010	5.750	6.000	5.875	6.875	...	...	...
4 1/16	...	...	...	5.875	6.875	...	...	...
4 1/8	6.010	5.750	6.000	6.063	7.000	6.250	...	...
4 3/16	...	...	...	6.063	7.000	...	...	...
4 1/4	6.010	5.750	6.000	6.063	7.000	6.750	...	...
4 5/16	...	...	...	6.375	7.375	...	...	...
4 3/8	...	...	...	6.375	7.375	...	...	...
4 7/16	...	...	...	6.375	7.375	...	...	...
4 1/2	6.010	6.000	6.000	6.625	7.625	7.000	...	...
4 5/8	...	...	...	6.625	7.625	7.000	...	...
4 3/4	...	...	...	6.625	7.625	...	...	...
5	...	...	...	...	...	7.500	...	...
5 3/4	...	...	...	...	...	7.750	...	...
6 1/8	...	...	...	...	...	8.000	...	...

Table 4.2.5-7M Length Classes for Metric Socket Wrenches

	¼ in. Drive					⅜ in. Drive					½ in. Drive			¾ in. Drive		1 in. Drive
	Type I				Type III	Type I				Type III	Type I		Type III	Type I		Type I
Nominal Opening	Regular, Max.	Long Min.	Long Max.	Extra Long, Min.	Regular, Max.	Regular, Max.	Long Min.	Long Max.	Extra Long, Min.	Regular, Max.	Regular, Max.	Long, Min.	Regular, Max.	Regular, Max.	Long, Min.	Regular, Max.
3.2	26	26.25	48.75	49	33.0	...	...	...	...	...	...	...	...	...	...	...
4	26	26.25	48.75	49	33.0	...	...	...	...	...	...	...	...	...	...	...
4.5	26	26.25	48.75	49	...	...	...	...	...	...	...	...	...	...	...	...
5	26	26.25	48.75	49	36.1	...	...	...	...	...	...	...	...	...	...	...
5.5	26	26.25	48.75	49	36.5	32	32.25	43.75	44	...	...	...	...	...	...	...
6	26	26.25	48.75	49	37.0	32	32.25	43.75	44	...	...	...	...	...	...	...
6.3	26	26.25	48.75	49	38.3	32	32.25	43.75	44	...	...	...	...	...	...	...
7	26	26.25	48.75	49	38.3	32	32.25	43.75	44	50	...	...	...	...	...	...
8	26	26.25	48.75	49	39.3	32	32.25	43.75	44	51	46	76	...	...	...	...
9	26	26.25	48.75	49	39.5	32	32.25	43.75	44	51	46	76	...	...	...	...
10	26	26.25	48.75	49	40.0	32	32.25	43.75	44	51	46	76	...	...	...	...
11	26	26.25	48.75	49	43.0	32	32.25	43.75	44	55	46	76	...	...	...	...
12	26	26.25	48.75	49	43.0	32	32.25	43.75	44	55	46	76	61	...	...	...
13	26	26.25	48.75	49	43.0	32	32.25	43.75	44	55	46	76	62	...	...	...
14	26	26.25	48.75	49	44.5	32	32.25	46.75	47	55	46	76	63	...	...	...
15	26	26.25	48.75	49	...	32	32.25	46.75	47	57	46	76	64	...	...	...
16	26	26.25	48.75	49	...	32	32.25	49.75	50	58	46	76	65	...	...	...
17	...	...	...	...	...	32	32.25	49.75	50	60	46	76	67	...	...	...
18	...	...	...	...	...	32	32.25	53.75	54	61	46	76	68	...	...	...
19	...	...	...	...	...	32	32.25	53.75	54	62	46	76	73	59	85	...
20	...	...	...	...	...	32	32.25	53.75	54	62	46	76	74	59	85	...
21	...	...	...	...	...	34	34.25	62.75	63	62	46	76	75	59	85	...
22	...	...	...	...	...	34	34.25	62.75	63	62	47	76	75	59	85	...
23	...	...	...	...	...	35	35.25	63.75	64	...	49	76	...	59	85	...
24	...	...	...	...	...	36	36.25	64.75	65	62	49	76	...	59	85	...
25	...	...	...	...	...	38	38.25	66.75	67	...	50	76	...	59	85	...
26	...	...	...	...	...	38	38.25	66.75	67	...	50	76	...	59	85	...

Table 4.2.5-7M Length Classes for Metric Socket Wrenches (Cont'd)

	¼ in. Drive					⅜ in. Drive					½ in. Drive			¾ in. Drive		1 in. Drive
	Type I				Type III	Type I				Type III	Type I		Type III	Type I		Type I
Nominal Opening	Regular, Max.	Long, Min.	Long, Max.	Extra Long, Min.	Regular, Max.	Regular, Max.	Long, Min.	Long, Max.	Extra Long, Min.	Regular, Max.	Regular, Max.	Long, Min.	Regular, Max.	Regular, Max.	Long, Min.	Regular, Max.
27	...	...	...	...	...	...	...	...	...	...	50	76	...	59	85	...
28	...	...	...	...	...	...	...	...	...	...	50	76	...	59	85	...
29	...	...	...	...	...	...	...	...	...	...	51	76	...	60	85	...
30	...	...	...	...	...	...	...	...	...	...	52	76	...	60	85	...
31	...	...	...	...	...	...	...	...	...	...	52	76	...	60	85	...
32	...	...	...	...	...	...	...	...	...	...	52	76	...	61	85	...
34	...	...	...	...	...	...	...	...	...	...	...	...	...	64	85	75
35	...	...	...	...	...	...	...	...	...	...	...	...	...	67	85	...
36	...	...	...	...	...	...	...	...	...	...	...	...	...	67	85	75
38	...	...	...	...	...	...	...	...	...	...	...	...	...	67	85	78
40	...	...	...	...	...	...	...	...	...	...	...	...	...	70	...	81
41	...	...	...	...	...	...	...	...	...	...	...	...	...	70	...	83
42	...	...	...	...	...	...	...	...	...	...	...	...	...	70	...	...
46	...	...	...	...	...	...	...	...	...	...	...	...	...	83	...	86
50	...	...	...	...	...	...	...	...	...	...	...	...	...	89	...	88
54	...	...	...	...	...	...	...	...	...	...	...	...	...	94	...	93
55	...	...	...	...	...	...	...	...	...	...	...	...	...	95	...	95
58	...	...	...	...	...	...	...	...	...	...	...	...	...	97	...	...
60	...	...	...	...	...	...	...	...	...	...	...	...	...	100	...	103
70	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	116
74	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	125

4.3 Design — Category 10

4.3.1 Type I, Handles

(a) Class 1, Hinged (See Figure 4.3.1-1). Handle shall include a steel-hinged square drive attached to a fork. The hinged square drive shall be suitable for operation at an angle within 90 deg in either direction from the longitudinal axis of the handle. The handle shall be provided with a tension device that will hold the square drive against gravity. The free end of the handle may have a transverse hole suitable for accommodating a slide rod. The hinge pin shall not extend beyond the periphery (or flat of the fork) by more than 0.031 in. The handle shall conform to Table 4.3.1-1 and pass the pin removal test in para. 5.4.

(b) Class 2, Reversible Ratchet (See Figure 4.3.1-2). Handle shall be either gear-head or clutch type and shall include a head for housing a ratchet mechanism and a drive tang. The horizontal (side to side) movement and vertical (up and down) movement of the square drive shall be held within the limits of Table 4.3.1-2. Ratcheting action shall be attained by means of a completely enclosed gear having hardened teeth engaging a hardened pawl(s) or by means of a completely enclosed clutch mechanism. Ratcheting action shall be reversible by manual movement of a shifting lever, button, or knob that permits ratcheting operation of the square drive in either direction of rotation. The ratcheting mechanism shall withstand the reverse torque of Table 4.3.1-2 when tested as specified in para. 5.3 and the drop test of para. 5.5. The ratchet handle shall withstand the proof torque specified and shall show no indication of damage or adverse effects on the ratcheting mechanism and the handle after removal of the test torque. Handles shall conform to Table 4.3.1-2.

(c) Class 3, Speeder. The requirements of para. 4.8.3 do not apply to these tools.

(1) Style A, Brace Type, Single Revolving Handgrip (See Figure 4.3.1-3). Handles shall have a square drive at one end and an attached rotatable metal handgrip or knob at the other end. Grips or knobs shall be constructed to rotate freely without binding after being subjected to the thrust load and pull loads specified in Table 4.3.1-3 and paras. 5.6 and 5.7. The shank shall not extend through the end of the handgrip or knob. Handles shall conform to Table 4.3.1-3.

(2) Style B, Spin Type, Screwdriver Grip (See Figure 4.3.1-4). Handles shall consist of a steel shank having a square drive at one end and a handgrip at the other end. The handle grip shall be shaped so as to afford a comfortable grip and shall be secured to the shank in such a manner that separation will not occur under the pulling load specified in Table 4.3.1-4. The handle grip shall be made of a durable and comfortable material. The handle shall be free from rough edges, sharp corners, or tool marks. Handles shall conform to Table 4.3.1-4.

(d) Class 4, T-Handle, Sliding (See Figure 4.3.1-5). Handle shall consist of a socket holder and a steel rod. The socket holder shall have a transverse tool to accommodate the rod and form a T- or L-handle tool. The socket holder shall have means to be secured at any desired point on the rod. Each end of the rod shall have a steel ball staked in place, or other means of preventing the socket holder from sliding off, except that this shall not be accomplished by flattening or crimping the ends of the bar. Sliding rod on $\frac{3}{4}$ and 1 in. drives may have the retaining feature on one end only. Handles shall conform to Table 4.3.1-5.

4.3.2 Type II, Attachments

(a) Class 1, Universal Joint (See Figure 4.2.5-1). Attachment shall consist of a square drive and a square internal socket permanently attached to each other or to an intermediate member in a manner to form a universal type of joint. The universal joint shall be provided with a tension device that shall hold the socket end relative to the drive end in any set position against gravity. It shall be capable of rotation in a complete circle when the angular deviation of either end member from the common centerline is 30 deg minimum. Hinge pins shall not extend beyond the periphery of the universal joint for more than 0.031 in. Attachments shall conform to Table 4.3.2-1 and pass the pin removal test in para. 5.4.

(b) Class 2, Extension Bar. Attachment shall have a square internal socket at one end and a square drive at the opposite end.

(1) Style A, Solid (See Figure 4.2.3-1). Attachment shall conform to Table 4.3.2-2.

(2) Style B, Flexible (See Figure 4.3.2-1). Attachment shall be capable of bending 90 deg and returning to within 5 deg of original alignment when released. Attachment shall be capable of sustaining the proof torque without permanent deformation in both clockwise and counterclockwise directions and shall conform to Table 4.3.2-4. The requirements of para. 4.8.3 do not apply to these tools.

(c) Class 3, Adapter

(1) Style A, Socket Wrench (See Figure 4.3.2-2). Attachment shall have a square drive at one end and an internal square socket at the other end. Attachments shall conform to Table 4.3.2-5.

(2) Style B, Ratchet (See Figure 4.3.2-3). Attachment shall have a square drive at one end and a square internal socket on the other end. The ratchet mechanism shall be the reversible type permitting ratcheting operation of the square drive in either direction and shall be completely enclosed. Attachments shall conform to Table 4.3.2-6.

Figure 4.3.1-1 Category 10, Type I, Class 1, Handles, Hinged

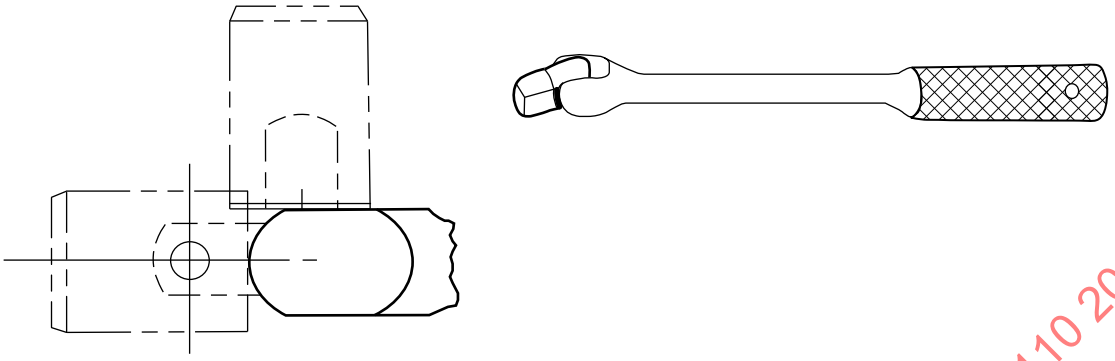


Table 4.3.1-1 Category 10, Type I, Class 1, Handles, Hinged

Drive Size	Minimum Overall Length [Note (1)]	Maximum Dimension Across Hinge	Handgrip		Minimum Proof Torque, lbf-in.	Maximum Shank Cross Section [Note (2)]	Minimum Required for Removal of Hinge Pins, lbf
			Minimum Length	Minimum Cross Section			
1/4	4.875	0.625	1.50	0.375	500	0.562	80
3/8	7.000	0.875	2.25	0.500	1,800	0.781	250
1/2	9.000	1.187	3.00	0.687	4,500	0.906	400
3/4	17.750	1.781	3.50	0.750	12,000	1.250	1,000
1	22.000	2.250	3.50	0.812	22,000	1.250	1,500

NOTES:
(1) This measurement shall be taken with square drive perpendicular to the handle.
(2) This measurement shall be taken at the midpoint of the handle's overall length.

Figure 4.3.1-2 Category 10, Type I, Class 2, Handles, Ratchet, Reversible

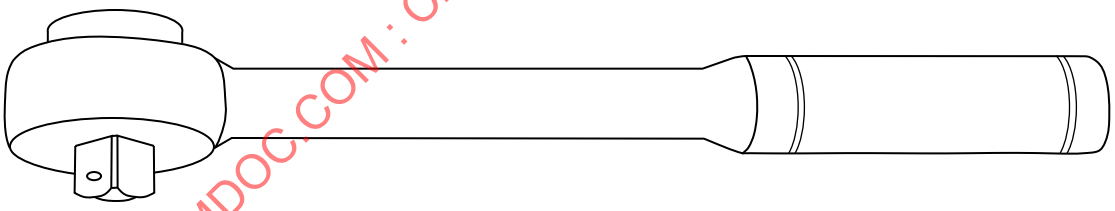


Table 4.3.1-2 Category 10, Type I, Class 2, Handles, Ratchet, Reversible

Drive Size	Minimum Overall Length	Head Dimensions		Minimum Handgrip Thickness or Diameter	Minimum Number of Teeth in Gearhead Gear	Maximum Horizontal or Side Movement of Square Drive in Handle	Maximum Vertical or Up and Down Movement of Square Drive in Handle	Maximum Reverse Torque Ratcheting Starting (Torsional Moment for Each Tooth of Gear), ozf-in.	Minimum Proof Torque, lbf-in.	Maximum Shank Handle (Diameter or Cross Section) [Note (1)]	Minimum Cycle Test Torque, lbf-in. [Note (2)]
		Maximum Width	Maximum Head Thickness Less Square Drive and Reverse Lever								
1/4	4.375	1.125	0.593	0.281	18	0.012	0.020	10	500	0.562	100
3/8	5.750	1.875	0.875	0.500	18	0.014	0.020	25	1,800	0.781	360
1/2	9.500	1.937	1.000	0.500	24	0.014	0.028	50	4,500	0.906	900
3/4	17.000	2.875	1.375	0.750	24	0.014	0.034	200	12,000	1.562	2,400
1	20.000	3.875	1.750	0.750	24	0.014	0.034	300	22,000	1.687	4,400

NOTES:
(1) This measurement shall be taken at the midpoint of the handle's overall length.
(2) Cycle test torque is 20% of proof torque.

Figure 4.3.1-3 Category 10, Type I, Class 3, Style A, Handles: Speeder, Brace Type, Single Revolving Handgrip

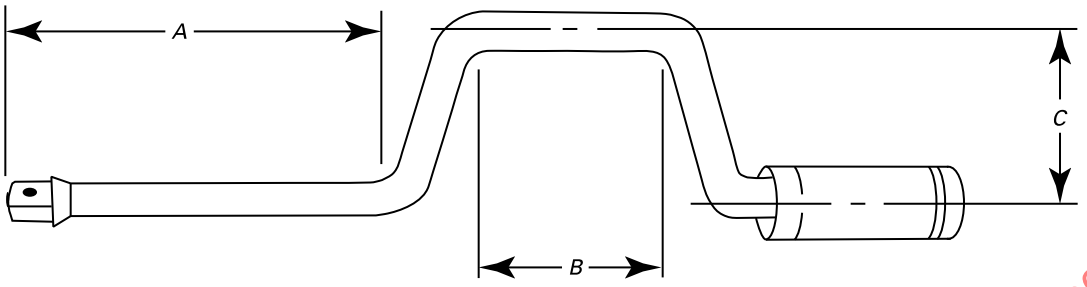


Table 4.3.1-3 Category 10, Type I, Class 3, Style A, Handles: Speeder, Brace Type, Single Revolving Handgrip

Drive Size	Maximum Diameter of Rod	Overall Length		Minimum Radius of Crank Sweep, *C*	Minimum Length Extension, *A*	Minimum Thrust Load End Grip, lbf	Minimum Proof Torque Offset Handle Rotating Direction, lbf-in.	Minimum End Grip Removal Pull Test, lbf	Minimum Grip Length, *B*
		Min.	Max.						
1/4	0.437	12	16.5	2.500	5.0	50	140	50	2.50
3/8	0.500	14	18.0	2.875	5.0	100	475	50	2.50
1/2	0.562	16	20.0	3.375	5.5	125	700	50	3.25

Figure 4.3.1-4 Category 10, Type I, Class 3, Style B, Handles: Speeder, Spin Type, Screwdriver Grip

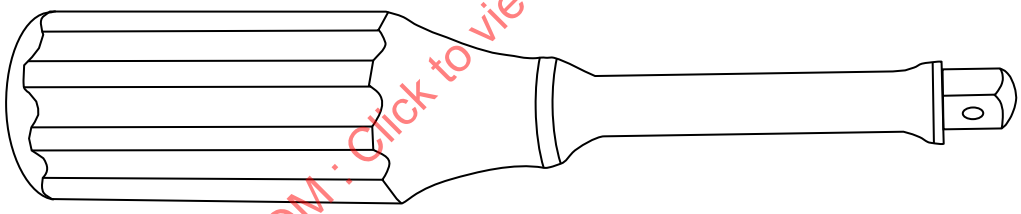


Table 4.3.1-4 Category 10, Type I, Class 3, Style B, Handles: Speeder, Spin Type, Screwdriver Grip

Drive Size, in.	Minimum Length of Shank Beyond Handle, in.	Handle Length, in.		Diameter, in.		Minimum Pull Load on Shank, lb	Minimum Torque, lbf-in.
		Min.	Max.	Min.	Max.		
1/4	1.87	2.63	4	0.88	1.27	50	90

Figure 4.3.1-5 Category 10, Type I, Class 4, Handles, T, Sliding

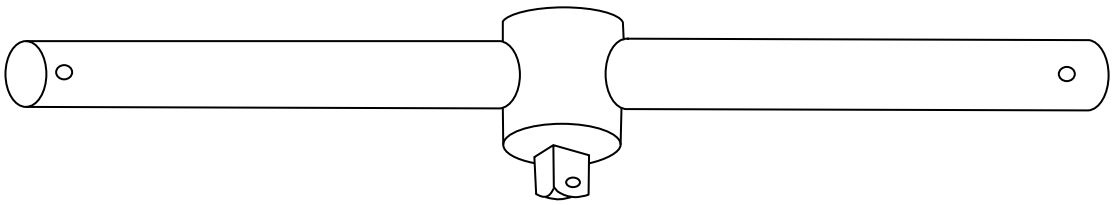


Table 4.3.1-5 Category 10, Type I, Class 4, Handles, T, Sliding

Drive Size	Sliding Rod Diameter Min.	Sliding Rod Diameter Max.	Minimum Length	Maximum Socket Holder Overall Length	Minimum Proof Torque, lbf-in.
1/4	0.230	0.313	4	1.093	400
3/8	0.355	0.438	6	1.375	1,000
1/2	0.480	0.625	9	1.750	2,500
3/4	0.730	0.875	17	2.500	9,000
1	0.855	1.125	20	3.500	15,000

Table 4.3.2-1 Category 10, Type II, Class 1, Attachments, Universal Joint

Drive Size	Maximum Overall Length	Maximum Diameter	Minimum Proof Torque, lbf-in.	Minimum Force Required for Removal of Hinge Pins, lbf
1/4	1.50	0.59	250	80
3/8	2.25	0.79	750	250
1/2	2.88	1.01	1,750	400
3/4	4.25	1.63	4,000	1,000

Table 4.3.2-2 Category 10, Type II, Class 2, Style A, Attachments, Extension Bar, Solid

Drive Size	Maximum Shank Diameter	Minimum Proof Torque, lbf-in.
1/4	0.343	500
3/8	0.500	1,800
1/2	0.665	4,500
3/4	1.000	12,000
1	1.375	22,000

Figure 4.3.2-1 Category 10, Type II, Class 2, Style B, Attachments, Extension Bar, Flexible

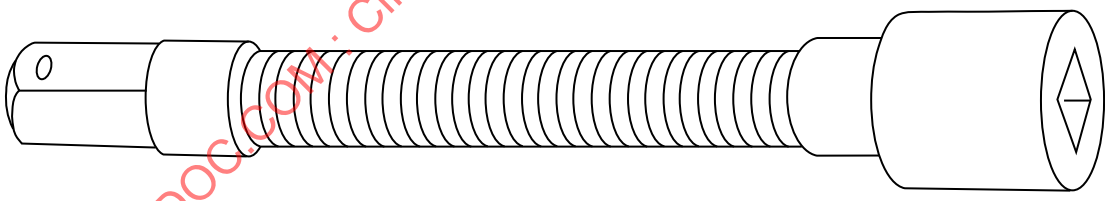


Table 4.3.2-3 Length Ranges for Category 10, Type II, Class 2, Style A, Attachments, Extension Bar, Solid

Drive Size	Nominal Length	Overall Length	
		Min.	Max.
1/4	1	1.0	1.5
1/4	2	1.5	2.5
1/4	3	2.5	3.5
1/4	4	3.5	4.5
1/4	6	5.5	6.5
1/4	10	9.5	10.5
1/4	14	13.5	14.5
1/4	17	16.5	17.5
3/8	1	1.0	1.5
3/8	2	1.5	2.5
3/8	3	2.5	3.5
3/8	5	4.5	5.5
3/8	6	5.5	6.5
3/8	8	7.5	8.5
3/8	9	8.5	9.5
3/8	10	9.5	10.5
3/8	11	10.5	11.5
3/8	12	11.5	12.5
3/8	18	17.0	19.0
3/8	20	19.0	21.0
3/8	24	23.0	25.0
3/8	34	33.0	35.0
1/2	2	1.5	3.0
1/2	3	2.5	3.5
1/2	5	4.5	6.0
1/2	6	5.5	6.5
1/2	10	9.5	10.5
1/2	15	14.5	15.5
1/2	20	19.0	21.0
1/2	24	23.0	25.0
1/2	30	29.0	31.0
1/2	34	33.0	35.0
1/2	36	35.0	37.0
1/2	48	46.0	50.0
3/4	3	2.5	3.5
3/4	5	4.5	5.5
3/4	8	7.5	8.5
3/4	16	15.0	17.0
1	8	7.5	8.5
1	17	16.0	18.0

Table 4.3.2-4 Category 10, Type II, Class 2, Style B, Attachments, Extension Bar, Flexible

Drive Size	Minimum Overall Length	Minimum Proof Torque, lbf-in.
1/4	3.5	25
3/8	7.5	35

Figure 4.3.2-2 Category 10, Type II, Class 3, Style A, Attachments, Adapter, Socket Wrench

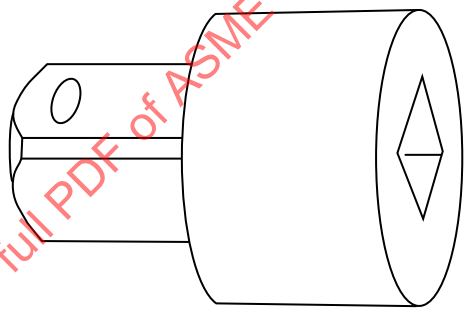


Table 4.3.2-5 Category 10, Type II, Class 3, Style A, Attachments, Adapter, Socket Wrench

Drive Size		Overall Length			
External Drive	Internal Drive	Min.	Max.	Maximum Outside Diameter	Minimum Proof Torque, lbf-in.
3/8	1/4	0.625	1.000	0.625	500
1/4	3/8	0.625	1.125	0.687	500
1/2	3/8	1.093	1.500	0.875	1,800
3/8	1/2	1.250	1.500	1.000	1,800
3/4	1/2	1.500	1.937	1.125	4,500
1/2	3/4	1.687	2.125	1.500	4,500
3/4	1	2.250	2.875	2.000	12,000
1	3/4	2.000	2.625	1.500	12,000

Figure 4.3.2-3 Category 10, Type II, Class 3, Style B, Attachments, Adapter, Ratchet

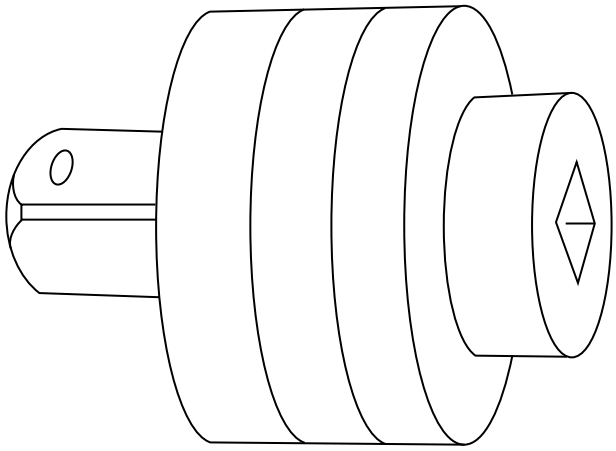


Table 4.3.2-6 Category 10, Type II, Class 3, Style B, Attachments, Adapter, Ratchet

Drive Size	Maximum Outside Diameter Socket End	Maximum Overall Length	Minimum Number of Teeth in Gear	Maximum Reverse Torque Ratcheting Starting (Torsional Moment for Each Tooth of Gear), ozf-in.	Minimum Proof Torque, lbf-in.
1/4	1.125	2.000	18	10	450
3/8	1.437	2.125	18	25	1,500
1/2	1.750	3.000	18	60	4,000
3/4	2.625	4.000	18	120	7,500
1	3.500	5.125	18	300	15,000

4.4 Design — Category 12

4.4.1 Type I, Class 1: Conventional Length — Solid Shaft. Type I, Class 1 nutdrivers shall consist of a round steel solid shaft with a socket at one end and a handle at the other end. The nutdrivers shall be similar to Figure 4.4.1-1 and conform to Table 4.4.1-1 (Table 4.4.1-1M) for the size specified. Style A nutdrivers shall have a conventional color-coded handle and/or shaft. Style B nutdrivers shall have a cushion grip handle and need not be color-coded.

4.4.2 Type I, Class 2: Conventional Length — Hollow Shaft. Type I, Class 2 nutdrivers shall consist of a round steel hollow shaft with a socket at one end and a handle at the other end. The nutdrivers shall be similar to Figure 4.4.2-1 and conform to Table 4.4.2-1 (Table 4.4.2-1M) for the size specified. The minimum hole depth for hollow shaft nutdrivers shall be dimension *F* in Figure 4.4.2-1. Style A nutdrivers shall have a conventional color-coded handle and/or shaft. Style B nutdrivers shall have a cushion grip handle and need not be color-coded.

4.4.3 Type II: Stubby Length. Type II nutdrivers shall consist of a round steel shaft with a socket at one end and a handle at the other end. There shall be a bolt clearance hole in the shaft of the socket end. The nutdriver shall be similar to Figure 4.4.3-1 and conform to Table 4.4.3-1 (Table 4.4.3-1M) for the size specified. Style A nutdrivers shall have a conventional color-coded handle and/or shaft. Style B nutdrivers shall have a cushion grip handle and need not be color-coded.

4.4.4 Type III: Miniature Handle. Type III nutdrivers shall consist of a round steel shaft with a socket at one end and a handle at the other end. There shall be a bolt clearance hole in the shaft socket end. The nutdriver shall be similar to Figure 4.4.4-1 and conform to Table 4.4.4-1 (Table 4.4.4-1M) for the size specified. The handle and/or shaft shall be color-coded.

4.4.5 Handles

(a) Color Coding. Color coding is optional. When color coding is used, Style A nutdrivers shall have handles and/or shafts color-coded in accordance with the following:

Socket Opening Nominal Size		
in.	mm	Color
5/64	2	Amber or yellow
3/32	3	Blue
7/64	3.2	Brown
1/8	4	Red
5/32	4.5	Amber or yellow
3/16	5	Black
7/32	5.5	Brown
1/4	6	Red
9/32	7	Orange
5/16	8	Amber or yellow
11/32	9	Green
3/8	10	Blue
7/16	11	Brown
1/2	12	Red
9/16 and larger	13 and larger	Optional

(b) Handle Shape and Finish. Handles shall be suitably shaped and finished to provide a comfortable grip. They shall be free from rough edges, sharp corners, or tool marks that affect the appearance and comfort of the tool. They shall meet the dimensional requirements specified in the applicable tables.

(c) Handle with Internal Drive. When specified, handles shall be provided with a 1/4-in. (6.3-mm) or 3/8-in. (10-mm) square internal drive opening. Square drive dimensions and tolerances shall be in accordance with ASME B107.4. The drive shall be flush with the butt end of the handle. The drive shall be capable of meeting the same torsional load requirements as set forth for the socket end contained herein. A square drive in accordance with ASME B107.4 shall be used for the test mandrel.

(d) Cushion Grip. Style B nutdriver handles shall be furnished with cushion grips. The grip material shall be capable of meeting the handle solvent test as specified in para. 5.11. The length of the cushion grip shall be at least 60% of the handle length, and there shall be no detectable slippage between the handle and the cushion grip under normal use. The original hardness shall be Shore A50 to A75 when tested in accordance with ASTM D2240, and the hardness after the solvent test shall not be greater than Shore A80.

WARNING: Cushion grips do not provide protection against electric shock and shall not be used on or near live electrical circuits.

Figure 4.4.1-1 Category 12, Type I, Class 1, Styles A and B: Conventional Length Nutdriver With Solid Shaft

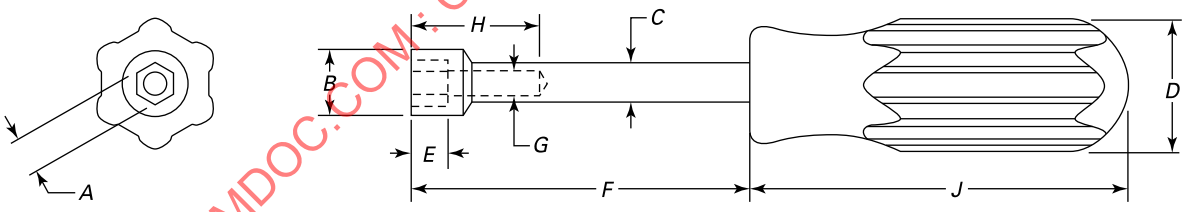


Table 4.4.1-1 Category 12, Type I, Class 1, Styles A and B: Conventional Length Nutdriver With Solid Shaft

Nominal Socket Opening, *A*	Maximum Socket Outside Diameter, *B*	Maximum Shaft Diameter, *C*	Minimum Handle Outside Diameter, *D*	Minimum Hex Depth, *E*	Minimum Shaft Length, *F*	Minimum Hole Diameter, *G*	Minimum Depth of Hole, *H*	Minimum Handle Length, *J*	Minimum Proof Torque, lbf-in.	Minimum Bending Moment Test Load, lbf-in.
5/32	0.335	0.32	0.87	0.18	2.81	0.100	1.00	3.12	50	45
3/16	0.385	0.32	0.87	0.18	2.81	0.105	1.00	3.12	75	60
7/32	0.400	0.32	0.87	0.18	2.81	0.115	1.00	3.12	75	60
1/4	0.450	0.38	0.87	0.18	2.81	0.118	1.00	3.12	100	90
9/32	0.475	0.38	0.87	0.18	2.81	0.129	1.00	3.12	100	90
5/16	0.510	0.38	0.87	0.21	2.81	0.141	1.00	3.12	125	105
11/32	0.545	0.38	0.87	0.25	2.81	0.170	1.00	3.12	125	105
3/8	0.585	0.45	0.87	0.25	2.81	0.196	1.00	3.12	150	120
7/16	0.660	0.45	1.00	0.28	2.81	0.265	1.00	3.50	150	145
1/2	0.720	0.51	1.00	0.31	2.81	0.321	1.00	3.50	175	175
9/16	0.814	0.57	1.06	0.43	2.87	0.386	1.00	3.62	175	260
5/8	0.892	0.63	1.06	0.43	2.87	0.445	1.00	3.62	200	300
11/16	0.952	0.70	1.12	0.43	3.87	0.445	1.00	3.62	250	375
3/4	1.054	0.70	1.12	0.43	3.87	0.505	1.00	4.00	250	375
13/16	1.108	0.70	1.12	0.43	3.87	0.567	1.00	4.00	250	375
7/8	1.201	0.70	1.12	0.43	3.87	0.567	1.00	4.00	250	375

Table 4.4.1-1M Category 12, Type I, Class 2, Styles A and B: Conventional Length Nutdriver With Solid Shaft

Nominal Socket Opening, *A*	Maximum Socket Outside Diameter, *B*	Maximum Shaft Diameter, *C*	Minimum Handle Outside Diameter, *D*	Minimum Hex Depth, *E*	Minimum Shaft Length, *F*	Minimum Hole Diameter, *G*	Minimum Depth of Hole, *H*	Minimum Handle Length, *J*	Minimum Proof Torque, N·m	Minimum Bending Moment Test Load, N·m
4	8.5	8.1	22	2.4	70	2.2	25	79	8	7
4.5	9.7	8.1	22	2.6	70	2.5	25	79	8	8
5	9.7	9.5	22	2.8	70	2.9	25	79	9	8
5.5	10.2	9.5	22	2.8	70	3.3	25	79	11	9
6	10.8	9.5	22	3.1	70	3.6	25	79	11	11
7	12.1	9.5	22	3.6	70	4.2	25	79	11	12
8	13.0	10.2	22	3.6	70	5.2	25	79	11	14
9	13.8	11.8	22	4.1	70	5.3	25	79	13	15
10	15.6	11.8	25	4.6	70	6.3	25	88	16	18
11	16.8	13.4	25	5.5	70	7.3	25	88	20	22
12	17.5	15.0	25	6.1	70	8.3	25	88	23	26
13	18.5	15.0	25	6.1	70	8.3	25	88	24	32
14	20.6	16.8	27	6.1	70	10.1	25	92	23	39
16	22.7	16.8	27	7.0	70	11.1	25	92	26	45
17	23.6	16.8	27	8.0	70	11.7	25	92	31	49
18	24.5	16.8	27	9.0	70	12.2	25	92	34	56