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AN AMERICAN NATIONAL STANDARD

Hexagon Socket Flat Countersunk Head Cap Screws (Metric Series)

ASME/ANSI B18.3.5M-1986

(REVISION OF ANSI/ASME B18.3.5M-1983)

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FOREWORD

(This Foreword is not part of ASME/ANSI B18.3.5M-1986.)

American National Standards Committee B18 for the standardization of bolts, screws, nuts, rivets, and similar fasteners was organized in March 1922 as Sectional Committee B18 under the aegis of the American Engineering Standards Committee (later the American Standards Association, then the United States of America Standards Institute and, as of October 6, 1969, the American National Standards Institute) with the Society of Automotive Engineers and the American Society of Mechanical Engineers as joint sponsors.

Subcommittee 9 was established in April of 1929 to undertake development and oversee maintenance of standards covering socket head cap screws and set screws. In line with a general realignment of the subcommittee structure on April 1, 1966, Subcommittee 9 was redesignated Subcommittee 3. Over the intervening years this activity has produced several versions of American National Standards covering inch series socket cap, shoulder, and set screws bearing the B18.3 designation.

At the December 4, 1974 meeting of American National Standards Committee B18, Subcommittee 3 was assigned the task of preparing standards for metric series socket screw products paralleling that contained in the latest ANSI B18.3 document. The Subcommittee was also instructed to continue coordination with the International Standards Organization, ISO Technical Committee 2, and Working Group 3 under that activity and, to the extent possible, keep the proposals for metric standards under development in conformance with agreements reached therein.

Subsequent meetings of Subcommittee 3 held in February 1975 and January 1976 resulted in general agreement on the following basic principles to be considered in developing the metric version of the standard.

(*a*) To assure consumers continuity of performance integrity consistent with inch socket screw products, the metric standards should maintain the same quality levels as their inch counterparts.

(*b*) To facilitate and expedite the processing, acceptance, and adoption of the metric versions, proposals for the various product categories should be prepared as separate and complete product standards.

(*c*) To promote understanding and assimilation during the transition to metric, the dimensional symbols, designations, terminology, and basic formats of the metric standards should be kept similar to those used in the ANSI B18.3 document.

There is no present or proposed ISO document for hexagon socket flat countersunk head cap screws, and the work in ISO/TC2/WG3 is proceeding slowly. Three different proposals have been submitted to WG3 for consideration and a draft document combining the best features of these proposals was circulated to the industry and many users. At the Subcommittee meeting of May 1982, it was voted to submit this draft, as modified, as a proposed standard. It is noted that these screws are functionally interchangeable with those recently adopted by the United Kingdom as BSI 4168-1982, with the exception of the class of thread fit, with the U.S. document specifying class 4g6g in line with past practice.

The document was modified to suit the ASME/ANSI format and was submitted for letter ballot vote to ASME Committee B18 and for public review. It was granted recognition as an American National Standard on April 8, 1983.

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A periodic review of the standard, undertaken by the Subcommittee in 1985, resulted in agreement that the document should be revised to add corrosion-resistant steel and to incorporate by reference ASTM documents for the appropriate mechanical, chemical, and testing requirements for the hexagon socket flat countersunk head cap screw products. A proposal containing these changes, as well as editorial corrections, was prepared and balloted by letter ballot to ASME Committee B18. Following approval by ASME, the proposal was submitted to the American National Standards Institute and designated an American National Standard on September 25, 1986.

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HEXAGON SOCKET FLAT COUNTERSUNK HEAD CAP SCREWS (METRIC SERIES)

1 GENERAL

1.1 Scope

1.1.1 This Standard contains complete general and dimensional requirements for Metric Series Hexagon Socket Flat Countersunk Head Cap Screws of nominal sizes from 3 mm to 20 mm recognized as American National Standard. Also included are appendices covering formulas for dimensions, part numbering system and preferred sizes for government use, and thread dimensions. The application of these screws is limited by their design as noted below.

This product is designed and recommended for applications where a flush seating socket head screw is desired. Wrenchability is limited by the socket size and key engagement. Because of the head configuration, this product is not recommended where maximum fatigue resistance is required.

1.1.2 The inclusion of dimensional data in this Standard is not intended to imply that all of the products described are stock production sizes. Consumers should consult with manufacturers concerning lists of stock production sizes.

1.1.3 Screws purchased for government use shall conform to this Standard and to the requirements of Appendix II.

1.2 Interchangeability

Hexagon socket flat countersunk head cap screws manufactured to this Standard are intended for structural use. There is no ISO standard in existence for the product at this time, and this design differs from and is not interchangeable with many similar metric parts. It is, however, functionally interchangeable with BS 4168-1982, and may be substituted for those parts.

1.3 Dimensions

All dimensions in this Standard are given in millimeters (mm) and apply before plating unless stated otherwise.

1.4 Options

Options, where specified, shall be at the discretion of the manufacturer unless agreed upon otherwise by manufacturer and purchaser.

1.5 Responsibility for Modification

The manufacturer shall not be held responsible for malfunctions of product due to plating or other modifications, when such plating or modification is not accomplished under his control or direction.

1.6 Terminology

For definitions of terms relating to fasteners or to component features thereof used in this Standard, refer to ANSI B18.12, Glossary of Terms for Mechanical Fasteners.

1.7 Designation

Hexagon socket flat countersunk head cap screws conforming to this Standard shall be designated by the following data in the sequence shown:

(*a*) Specification (ASME/ANSI document) number followed by a dash;

(*b*) Nominal size of screw;

(*c*) Thread pitch, preceded by ×;

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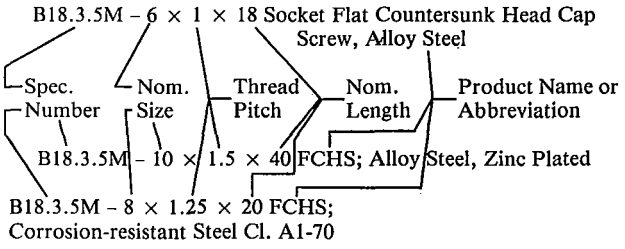
(*d*) Nominal screw length, preceded by ×;

(*e*) Product name. If desired, the product name may be abbreviated FCHS.

(*f*) Material and property class. Alloy steel screws shall be supplied to property class 12.9 as specified in ASTM F 835M. For corrosion-resistant steel screws, the property class and material requirements shall be as specified in ASTM F 879M (see para. 3.1).

(*g*) Protective finish, if required.

Examples:



1.8 Part Numbering System

For users who need a definitive part numbering system, one is suggested in Appendix II.

2 DIMENSIONAL CHARACTERISTICS

The following requirements supplement the dimensional data presented in Tables 1A, 1B, and 2 and shall apply to the respective features of screws.

2.1 Heads

2.1.1 Head Diameters. The maximum sharp values listed under *A* in Table 1A are theoretical values, as it is not practical to make the edges of the head sharp. The maximum sharp value represents the exact diameter of a hole countersunk to exactly 90 deg., in which a screw having maximum head size will fit flush.

2.1.2 Head Height. The tabulated values for head height are given for reference only and are calculated to the maximum formulation.

2.1.3 Flushness Tolerance. The flushness-tolerance is the distance the top surface of a screw having the minimum head size will be below the flush condition in a hole countersunk exactly 90 deg. to the maximum sharp dimension listed under *A* in Table 1A.

2.1.4 Fillet. A fillet between the conical bearing surface of the head and the shank (body) of the screw is allowable above the maximum tabulated value for *D* within the value listed for *F*.

2.2 Sockets

2.2.1 Socket Size. Sockets shall be nominal size *J* specified in Table 1A for the respective screw sizes and shall conform to the dimensions given in Table 2, as determined by gaging in accordance with para. 2.2.3.

2.2.2 Key Engagement. The key engagement depth shall conform to the minimum values specified for *T* in Table 1A, as determined by gaging in accordance with para. 2.2.3.

2.2.3 Socket Gaging. Acceptability of sockets shall be determined by the use of the hexagon socket gages specified in Table 3A. The hexagon sockets shall allow the GO member of the gage to enter freely to the minimum key engagement depth. The NOT GO gage member shall be permitted to enter only to a depth equivalent to 7.5% of the nominal socket size.

To determine the acceptability of sockets in plated products after plating, a GO gage identical in design and tolerances to that shown in Table 3A, except having a maximum width across flats dimension equal to the nominal socket size, shall be used.

2.2.4 Edge of Socket. The edge at the junction of the socket with the top of the head may be broken (rounded or chamfered) as depicted in Fig. 3, providing the depth of chamfer or rounding does not violate the NOT GO gage penetration limit specified in para. 2.2.3.

2.2.5 Broached Sockets. For hexagon broached sockets at or near the maximum size limit, the overcut resulting from drilling shall not exceed 20% of the length of any flat of the socket (see Fig. 2).

2.2.6 Socket True Position. The axis of the socket shall be located at true position relative to the axis of the screw within a tolerance zone having a diameter equal to 3% of the basic screw diameter or 0.26 mm, whichever is greater, for nominal screw sizes up to and including 12 mm; and equal to 6% of the basic screw diameter for sizes larger than 12 mm, regardless of feature size.

2.2.7 Wall Thickness. Wall thickness *G* may be controlled by using gaging shown in Appendix IV, Fig. IV-1.

2.3 Length

2.3.1 Measurement. The length of hexagon socket flat countersunk head cap screws shall be measured parallel to the axis of the screw from the plane of the top of the head to the extreme end of the shank.

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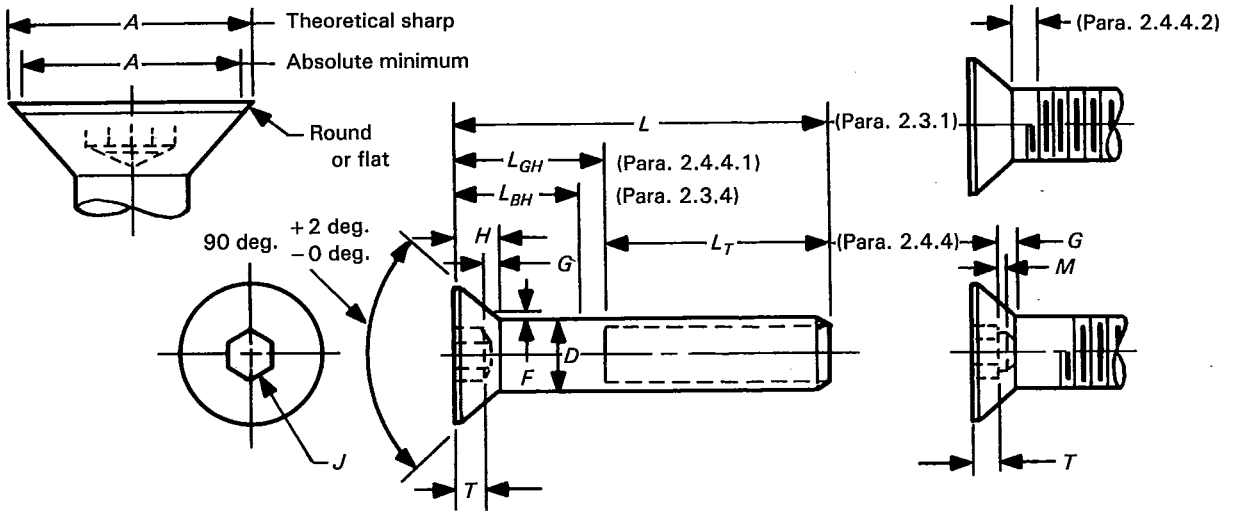


TABLE 1A DIMENSIONS OF METRIC COUNTERSUNK SOCKET HEAD CAP SCREWS

Nominal Size or Basic Screw Diameter	Thread Pitch	D		A		H		J	T	G	F	M
		Body Diameter		Head Diameter		Head Height		Hexagon Socket Size	Key Engagement	Socket Wall	Fillet Extension Above D	Drill Allow.
		Max.	Min.	Theoretical Sharp Max.	Absolute Min.	Reference	Flushness Tolerance	Nom.	Min.	Min.	Max.	Max.
3	0.5	3.0	2.86	6.72	5.35	1.86	0.30	2.0	1.1	0.25	0.25	0.3
4	0.7	4.0	3.82	8.96	7.80	2.48	0.30	2.5	1.5	0.45	0.35	0.4
5	0.8	5.0	4.82	11.20	9.75	3.10	0.35	3.0	1.9	0.66	0.40	0.5
6	1	6.0	5.82	13.44	11.70	3.72	0.35	4.0	2.2	0.70	0.50	0.6
8	1.25	8.0	7.78	17.92	15.60	4.96	0.40	5.0	3.0	1.16	0.60	0.8
10	1.5	10.0	9.78	22.40	19.50	6.20	0.50	6.0	3.6	1.62	0.80	0.9
12	1.75	12.0	11.73	26.88	23.40	7.44	0.60	8.0	4.3	1.80	0.90	1.2
14 (1)	2	14.0	13.73	30.24	26.18	8.12	0.70	10.0	4.7	1.62	1.00	1.5
16	2	16.0	15.73	33.60	28.96	8.80	0.80	10.0	4.8	2.20	1.00	1.5
20	2.5	20.0	19.67	40.32	34.60	10.16	1.00	12.0	5.6	2.20	1.20	1.8

NOTE:
(1) Not recommended for new design.

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TABLE 1B BODY AND GRIP LENGTHS

Nominal Diameter	M3		M4		M5		M6		M8		M10		M12		M14		M16		M20	
Nominal Length	L_{GH}	L_{BH}	L_{GH}	L_{BH}	L_{GH}	L_{BH}	L_{GH}	L_{BH}	L_{GH}	L_{BH}	L_{GH}	L_{BH}	L_{GH}	L_{BH}	L_{GH}	L_{BH}	L_{GH}	L_{BH}	L_{GH}	L_{BH}
35	17	14.5	15	11.5																
40	22	19.5	20	16.5	18	14														
45	27	24.5	25	21.5	23	19	21	16												
50	32	29.5	30	26.5	28	24	26	21	22	15.7										
55	37	34.5	35	31.5	33	29	31	26	27	20.7										
60			40	36.5	38	34	36	31	32	25.7	28	20.5								
65			45	41.5	43	39	41	36	37	30.7	33	25.5	29	20.2						
70			50	46.5	48	44	46	41	42	35.7	38	30.5	34	25.2	30	20				
80			60	56.5	58	54	56	51	52	45.7	48	40.5	44	35.2	40	30	36	26		
90					68	64	66	61	62	55.7	58	50.5	54	45.2	50	40	46	36		
100					78	74	76	71	72	65.7	68	60.5	64	55.2	60	50	56	46		
110							86	81	82	75.7	78	70.5	74	65.2	70	60	66	56	58	45.5
120							96	91	92	85.7	88	80.5	84	75.2	80	70	76	66	68	55.5
130									102	95.7	98	90.5	94	85.2	90	80	86	76	78	65.5
140									112	105.7	108	100.5	104	95.2	100	90	96	86	88	75.5
150									122	115.7	118	110.5	114	105.2	110	100	106	96	98	85.5

TABLE 2 DIMENSIONS OF METRIC HEXAGON SOCKETS

Nominal Socket Size	J		C
	Socket Width Across Flats		Socket Width Across Corners
	Max.	Min.	Min.
2	2.045	2.020	2.30
2.5	2.560	2.520	2.87
3	3.071	3.020	3.44
4	4.084	4.020	4.58
5	5.084	5.020	5.72
6	6.095	6.020	6.86
8	8.115	8.025	9.15
10	10.127	10.025	11.50
12	12.146	12.032	13.80

2.3.2 Tolerance On Length. The tolerance on length shall be bilateral as tabulated below:

Nominal Screw Length, mm	Tolerance on Length, mm
Up to 16, incl.	±0.3
Over 16 to 60, incl.	±0.5
Over 60 to 150, incl.	±0.8

2.3.3 Standard Lengths. The standard lengths for cap screws shall be as follows: 6, 8, 10, 12, 16, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 80, 90, 100, 110, 120, 130, 140, 150 mm.

2.3.4 Body Length, L_{BH}. The body length is the length, measured parallel to axis of screw, of the unthreaded portion of the shank and the head height (see Tables 1B and 3B).

2.4 Threads

2.4.1 Thread Series and Form. Unless specified otherwise, threads shall be the metric coarse series in accordance with ANSI/ASME B1.13M, Metric Screw Threads — M Profile.

2.4.2 Thread Tolerance Class. Threads shall be ISO Tolerance Class 4g6g. For plated screws, the allowance *g* may be consumed by the thickness of plating so that the maximum size limit after plating shall be that of Tolerance Class 4h6h. Thread limits shall be in accordance with ANSI/ASME B1.13M. See Appendix III, wherein the limiting dimensions applicable to thread sizes through M4 before and after plating are given for reference purposes. The allowable *g* shown therein for those sizes has been increased over that specified in ANSI/ASME B1.13M. However, because the minimum limits are unchanged, the screws will be totally interchangeable.

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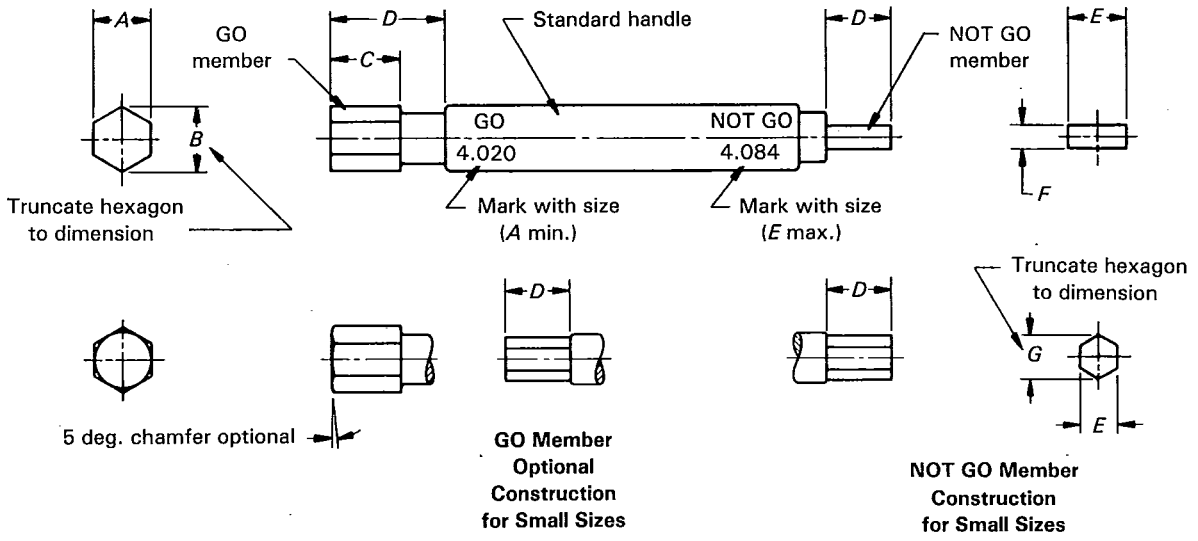


TABLE 3A DIMENSIONS OF HEXAGON SOCKET GAGES

Nominal Socket Size	A		B		C	D	E		F		G	
	GO Gage Width Across Flats		GO Gage Width Across Corners		GO Gage Length	Usable Gage Length	NOT GO Gage Width		NOT GO Gage Thickness		NOT GO Gage Width Across Corners	
	Max.	Min.	Max.	Min.	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
2.0	2.023	2.020	2.300	2.295	5.0	5.0	2.045	2.042	...	...	2.23	2.21
2.5	2.525	2.520	2.870	2.865	7.0	7.0	2.560	2.555	...	...	2.79	2.77
3.0	3.025	3.020	3.440	3.435	7.0	7.0	3.071	3.066	...	...	3.35	3.33
4.0	4.025	4.020	4.580	4.575	7.0	7.0	4.084	4.079	1.80	1.75	...	...
5.0	5.025	5.020	5.720	5.715	7.0	7.0	5.084	5.079	2.30	2.25	...	...
6.0	6.025	6.020	6.860	6.855	8.0	12.0	6.095	6.090	2.80	2.75	...	...
8.0	8.030	8.025	9.150	9.145	8.0	16.0	8.115	8.110	3.80	3.75	...	...
10.0	10.030	10.025	11.500	11.495	12.0	20.0	10.127	10.122	4.80	4.75	...	...
12.0	12.037	12.032	13.800	13.795	12.0	24.0	12.146	12.141	5.75	5.70	...	...

GENERAL NOTES:

(a) Gages shall be made from steel, hardened and tempered to a hardness of HRC 60 minimum. They shall be thermally stabilized and given suitable surface treatment to obtain maximum abrasion resistance.

(b) The form of hexagonal gage members shall be within the tolerance zone specified. See ANSI Y14.5M, Engineering Drawing and Related Documentation Practices, Dimensioning and Tolerancing.

(c) The surface roughness on hexagon flats shall be 0.2 μm (arithmetical average) maximum. See ANSI/ASME B46.1, Surface Texture.

(d) The gage handles shall conform to ANSI B47.1, Gage Blanks.

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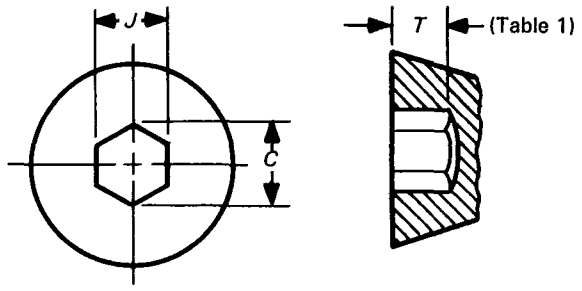


FIG. 1 FORGED HEXAGON SOCKET

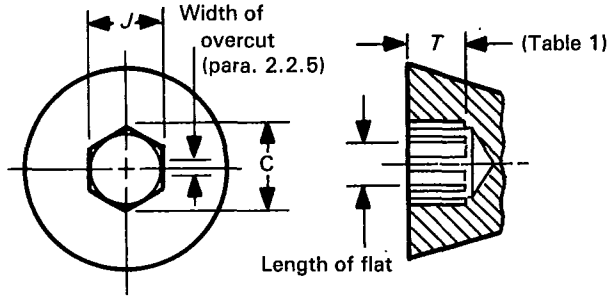


FIG. 2 BROACHED HEXAGON SOCKET

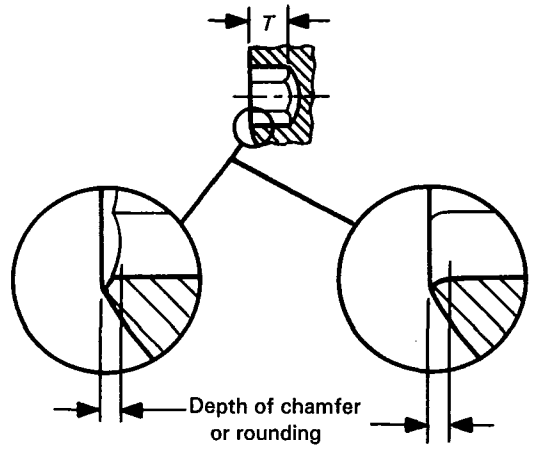


FIG. 3 SOCKET EDGE DETAIL

2.4.3 Thread Gaging. Acceptability of screw threads shall be determined based on System 22 of ANSI/ASME B1.3M.

2.4.4 Thread Length, L_T. The length of thread is controlled by the grip length L_{GH} specified in Table 1B.

2.4.4.1 Grip Length, L_{GH}. The tabulated L_{GH} values are maximum and represent the minimum design grip length, including the reference head height of the screw. They shall be measured from the top of the head to the face of a GO thread ring gage, having the thread countersink and/or counterbore removed, which has been assembled by hand as far as the thread will permit. The tabulated L_{BH} values are minimum and represent the minimum body length, including the reference head height of the screw. They are equal to L_{GH} minus 5 times the pitch of the thread for the respective screw size.

Screws having nominal lengths falling between those for which L_{GH} and L_{BH} values are tabulated in Table 1B shall have L_{GH} and L_{BH} dimensions conforming with those of the next shorter tabulated nominal length for the respective screw size.

2.4.4.2 Thread to Head. For screws of nominal lengths above the heavy line in Table 1B, the thread length shall govern the grip and body lengths. On these screws, the complete full-form threads, measured with a thread ring gage, having the thread chamfer and/or counterbore removed, shall extend to within 2 pitches (threads) of the intersection of the conical portion of the head with the body diameter.

2.4.4.3 Nontabulated Sizes. For screws of nominal lengths longer than those for which L_{GH} and L_{BH} values are tabulated in Table 1B, the grip gaging length of the screws shall be determined as follows:

$$L_{GH} = L - L_T$$
$$L_{BH} = L - L_{TT}$$

where

L = nominal length
L_T = minimum thread length from Table 3B
L_{TT} = maximum total thread length from Table 3B

2.5 Point

The end on screws of 5 mm nominal size and larger and of nominal lengths equivalent to 1.5 times the basic screw diameter or longer shall be chamfered. The chamfer shall extend slightly below the root of the thread and the edge between the flat, and the chamfer

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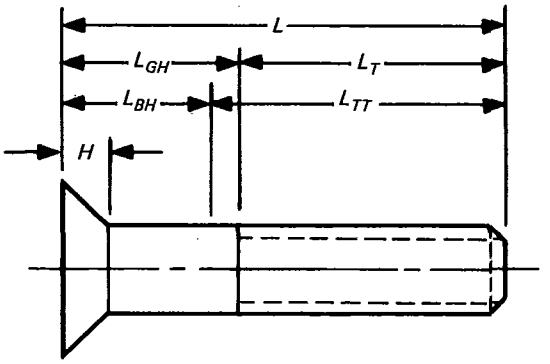


TABLE 3B THREAD LENGTHS FOR LENGTHS NOT TABULATED IN TABLE 1B

D Nominal Screw Diameter	L_T Minimum Thread Length	L_{TT} Maximum Total Thread Length
M3	18.0	20.5
M4	20.0	23.5
M5	22.0	26.0
M6	24.0	29.0
M8	28.0	34.3
M10	32.0	39.5
M12	36.0	44.8
M14	40.0	50.0
M16	44.0	54.0
M20	52.0	64.5

may be slightly rounded. The included angle of the point shall be approximately 90 deg. Chamfering on screw sizes up to and including 4 mm and of larger sizes having lengths shorter than 1.5 times the basic screw diameter shall be optional.

2.6 Concentricity

The body shall be concentric to the thread within a total runout of 0.13 mm per mm of body length (but not to exceed 0.64 mm) when the screw is held by the full threads closest to the head of the screw.

2.7 Surface Finish

2.7.1 Surface Roughness. For alloy steel screws of nominal lengths equal to or less than 8 times the basic screw diameter, the surface roughness of the screws before plating shall not exceed 1.6 μm AA on the fillet and head bearing surfaces, nor exceed 0.8 μm AA on the threads.

For longer lengths and corrosion-resistant steel screws, the surface roughness of the screws prior to plating shall not exceed 3.2 μm AA on the body, fillet, and head bearing surfaces.

Normally it shall be sufficient to ascertain that these surfaces on screws have the equivalent of a smooth machined finish by visual comparison with known surface standards. However, where it is practical and deemed necessary to measure these surfaces with commercially available equipment, roughness measurements shall be taken axially on the body and fillet surfaces, and circumferentially on the bearing surface.

3 MATERIAL, PROCESSING, AND MECHANICAL PROPERTIES

Hexagon socket flat countersunk head cap screws shall conform to the following requirements pertaining to materials, processing, mechanical and physical properties, and testing and sampling procedures.

3.1 Materials

3.1.1 Alloy Steel. Alloy steel metric flat countersunk head cap screws shall be fabricated from an alloy steel, and physical properties of screws, fabrication processes, and testing requirements shall conform to ASTM Specification F 835M, Alloy Metric Socket Button and Flat Countersunk Head Cap Screws.

3.1.2 Corrosion-Resistant Steel. Corrosion-resistant steel metric flat countersunk head cap screws shall be fabricated from austenitic corrosion-resistant steel and physical properties of screws, fabrication processes, and testing requirements shall conform to ASTM Specification F 879M, Stainless Steel Metric Button and Flat Countersunk Head Cap Screws. Unless otherwise specified, the property class shall be A1-70.

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APPENDIX I

FORMULAS FOR DIMENSIONS

(This Appendix is not part of ASME/ANSI B18.3.5M-1986, and is included here for information purposes only.)

Body Diameter D, Table 1A

D (max.) = Basic or nominal size — see table for values

D (min.) = D (max.) — IT13 tolerance from ISO system of limits and fits (ANSI B4.2)

Head Diameter A, Table 1A

A (max.)
A (min.)

Head Height H, Table 1A

H (ref.)
Flushness Tolerance

Key Engagement, Table 1A

T (min.)
G (min.)

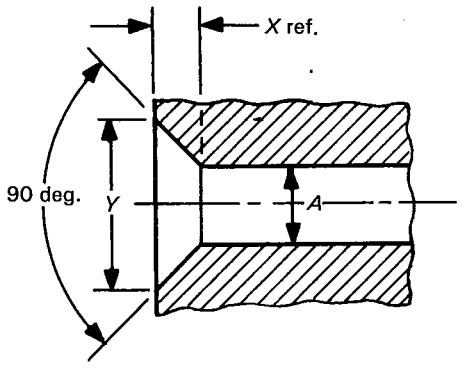


FIG. I-1 HOLE AND COUNTERSINK SIZES FOR FLAT COUNTERSUNK HEAD CAP SCREWS

TABLE I-1

D	A	X	Y
Nominal Screw Size	Nominal Hole Diam.	Countersink Depth (Ref.)	Countersink Diameter Min.
M3	3.5	1.61	6.72
M4	4.6	2.18	8.96
M5	6.0	2.60	11.20
M6	7.0	3.22	13.44
M8	9.0	4.46	17.92
M10	11.5	5.45	22.40
M12	13.5	6.69	26.88
M14	16.0	7.12	30.24
M16	18.0	7.80	33.60
M20	22.4	8.96	40.32

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APPENDIX II

GOVERNMENT STANDARD ITEMS AND PART NUMBERING SYSTEM

(This Appendix is not part of ASME/ANSI B18.3.5M-1986, and is included here for information purposes only.)

NOTE: The government encourages the general use of this Appendix to achieve maximum parts standardization.

This Appendix establishes standard items for government application, selected from the possible variations of items within the scope of the Standard, and provides a part numbering system for identification and application in engineering documents.

The following variations are standard:

(*a*) Diameter/Thread Pitch and Length Combinations — as specified in Table II-1

(*b*) Material (Alloy Steel or Corrosion-Resistant Steel, Property Class A1-70) — as coded in Part Numbering System

(*c*) Finish (Cadmium Plating or Zinc Coating for Alloy Steel; Cleaning, Descaling, and Passivation for Corrosion-Resistant Steel) — as coded in Part Numbering System

(*d*) Special Features — self-locking if specified

The part number shall consist of the following element codes in the order shown:

(*a*) Document identifier — ASME/ANSI Standard number less decimal points

(*b*) Material and finish

(*c*) Nominal diameter

(*d*) Nominal length

(*e*) Special features

NOTE: The Part Numbering System may also be used for nonstandard diameter and length combinations.

Quality Assurance Provisions. Quality assurance provisions shall be in accordance with ANSI B18.18.1M. Inspection Level B shall apply for thread acceptability.

Packaging. Packaging shall be in accordance with ASTM D 3951.

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TABLE II-1 METRIC HEXAGON SOCKET FLAT COUNTERSUNK HEAD CAP SCREWS — GOVERNMENT STANDARD ITEMS AND PART NUMBERING SYSTEM

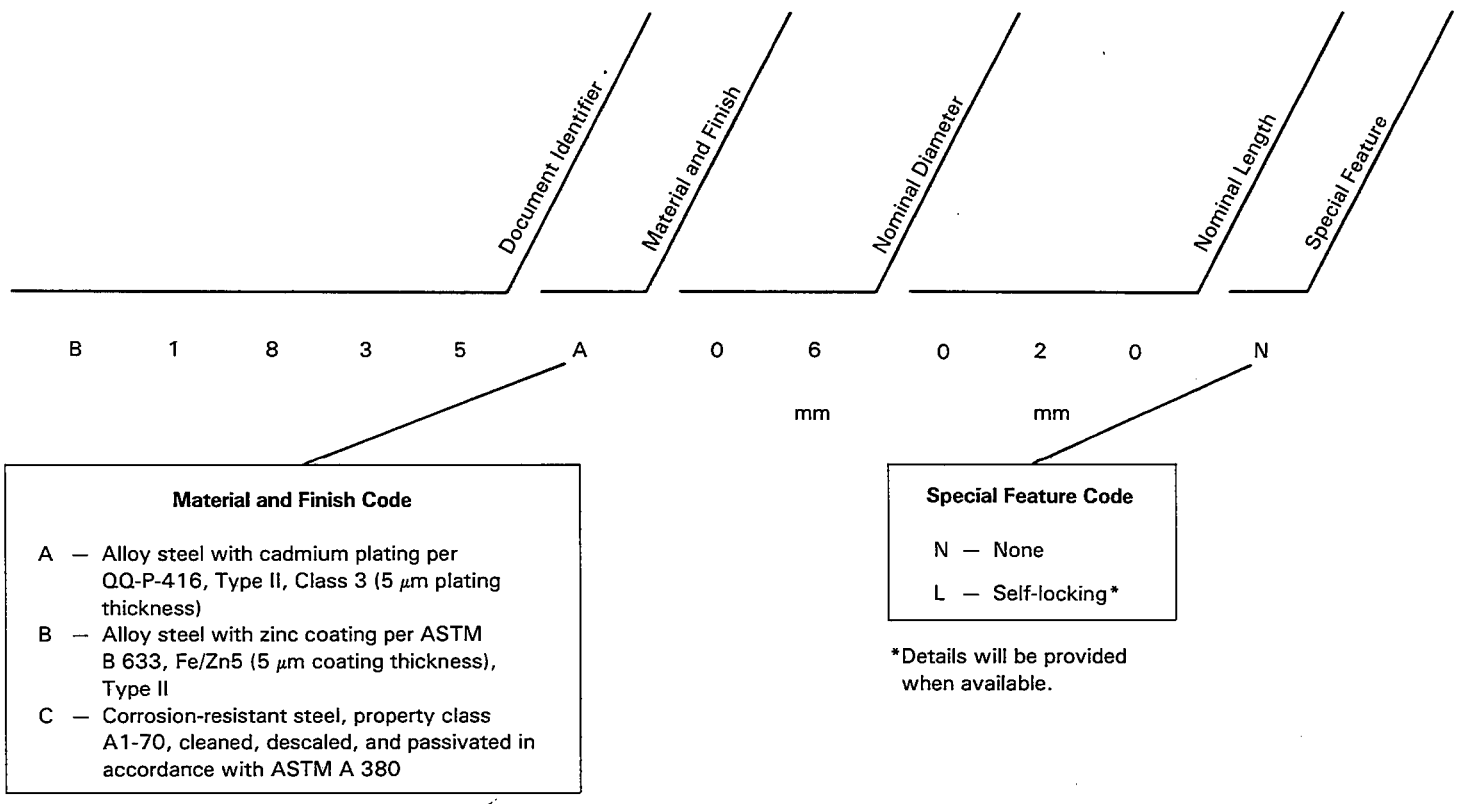
Nominal Length	Nominal Diameter and Thread Pitch								
	M3 × 0.5	M4 × 0.7	M5 × 0.8	M6 × 1	M8 × 1.25	M10 × 1.5	M12 × 1.75	M16 × 2	M20 × 2.5
6	03006								
8		04008	05008	06008					
10									
12					08012				
16						10016			
20									
25									
30	03030				Standard Diameter and Length Combination		12030	16030	20030
35									
40		04040							
45									
50			05050	06050					
55									
60									
70					08070				
80									
90						10090			
100									
110									
120							12120		
130									
140									
150								16150	20150

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PART NUMBERING SYSTEM COVERING STANDARD ITEMS FOR GOVERNMENT USE

NOTE: THE GOVERNMENT ENCOURAGES THE GENERAL USE OF THIS SYSTEM TO ACHIEVE MAXIMUM PARTS STANDARDIZATION.



EXAMPLE: B1835A06020N indicates a screw, cap, hexagon socket, flat countersunk head (metric) made of cadmium plated alloy steel, with M6X1 thread, 20 mm in length, with no special feature.

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APPENDIX III

DIMENSIONS OF METRIC THREADS FOR SOCKET SCREW PRODUCTS

(This Appendix is not part of ASME/ANSI B18.3.5M-1986, and is included here for information purposes only.)

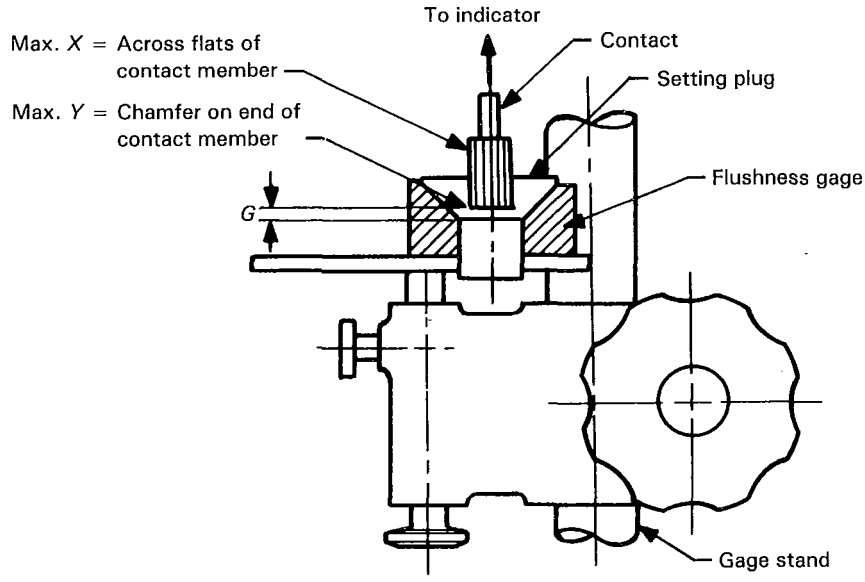
Nominal Size or Basic Thread Diameter	Pitch	Dimensions Before Plating [Note (1)]						Tolerance Class 4h6h [Note (2)]		
		Major Diameter		Pitch Diameter		Allowance	Root Radius	Major Diameter 6h	Pitch Diameter 4h	GO Gage Minor Diameter
		Max.	Min.	Max.	Min.		Min.	Max.	Max.	
M3	0.5	2.976	2.874	2.651	2.607	0.024	0.06	3.000	2.675	2.459
M4	0.7	3.976	3.838	3.521	3.467	0.024	0.08	4.000	3.545	3.242

NOTES:
(1) Applies to unplated or uncoated screws and plated or coated screws before plating or coating.
(2) Applies to plated or coated screws after plating or coating.

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APPENDIX IV
WALL THICKNESS GAGE

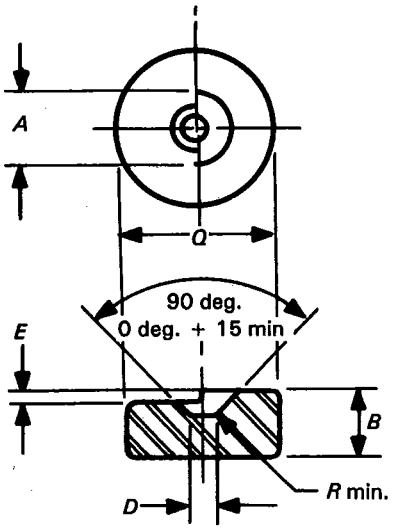
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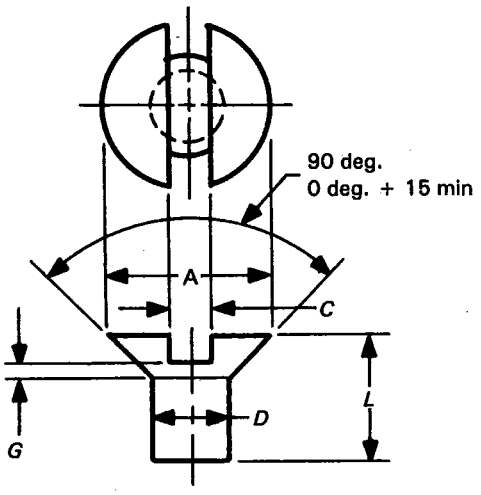
GENERAL NOTE: With gage assembled as shown, set dial indicator to read *G* dimension (dial indicator will now read hex wall directly.)

FIG. IV-1 SUGGESTED GAGE FOR FLAT COUNTERSUNK HEAD CAP SCREW TO CHECK MINIMUM WALL THICKNESS *G*

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Flushness Gage



Setting Plug

TABLE IV-1

D	*A*	*G*	*C*	*E*	*L* (Ref.)	*Q* (Ref.)	*B* (Ref.)	*R*	*X*	*Y*
M3	6.72	0.25	2.4	0.30	20	24	6	2	2.0	0.1
M4	8.96	0.45	2.9	0.30	20	24	10	2	2.5	0.1
M5	11.20	0.66	3.5	0.35	24	24	12	3	3.0	0.2
M6	13.44	0.70	4.7	0.35	24	30	12	3	4.0	0.2
M8	17.92	1.16	5.8	0.40	36	30	16	3	5.0	0.2
M10	22.40	1.62	7.0	0.50	36	35	16	3	6.0	0.2
M12	26.88	1.80	9.3	0.60	36	40	20	4	8.0	0.2
M14	30.24	1.62	11.6	0.70	36	45	22	4	10.0	0.2
M16	33.60	2.2	11.6	0.80	36	50	24	4	10.0	0.2
M30	40.32	2.2	13.8	1.0	36	60	25	4	12.0	0.2

GENERAL NOTE: All dimensions are maximum, with the exception of gage markers' tolerance, as noted.

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AMERICAN NATIONAL STANDARDS FOR BOLTS, NUTS, RIVETS, SCREWS, WASHERS, AND SIMILAR FASTENERS

Small Solid Rivets B18.1.1-1972 (R1983)
Large Rivets B18.1.2-1972 (R1983)
Metric Small Solid Rivets B18.1.3M-1983
Square and Hex Bolts and Screws — Inch Series B18.2.1-1981
Square and Hex Nuts B18.2.2-1972 (R1983)
Metric Hex Cap Screws B18.2.3.1M-1979
Metric Formed Hex Screws B18.2.3.2M-1979
Metric Heavy Hex Screws B18.2.3.3M-1979
Metric Hex Flange Screws B18.2.3.4M-1984
Metric Hex Bolts B18.2.3.5M-1979
Metric Heavy Hex Bolts B18.2.3.6M-1979
Metric Heavy Hex Structural Bolts B18.2.3.7M-1979
Metric Hex Lag Screws B18.2.3.8M-1981
Metric Heavy Hex Flange Screws B18.2.3.9M-1984
Metric Hex Nuts, Style 1 . . . . . B18.2.4.1M-1979
Metric Hex Nuts, Style 2 . . . . . B18.2.4.2M-1979
Metric Slotted Hex Nuts B18.2.4.3M-1979
Metric Hex Flange Nuts B18.2.4.4M-1982
Metric Hex Jam Nuts B18.2.4.5M-1979
Metric Heavy Hex Nuts B18.2.4.6M-1979
Socket Cap, Shoulder and Set Screws (Inch Series) B18.3-1982
Socket Head Cap Screws (Metric Series) B18.3.1M-1986
Metric Series Hexagon Keys and Bits B18.3.2M-1979 (R1986)
Hexagon Socket Head Shoulder Screws (Metric Series) B18.3.3M-1986
Hexagon Socket Button Head Cap Screws (Metric Series) B18.3.4M-1986
Hexagon Socket Flat Countersunk Head Cap Screws (Metric Series) B18.3.5M-1986
Metric Series Socket Set Screws B18.3.6M-1986
Round Head Bolts (Inch Series) B18.5-1978
Metric Round Head Short Square Neck Bolts B18.5.2.1M-1981
Metric Round Head Square Neck Bolts B18.5.2.2M-1982
Wood Screws B18.6.1-1981
Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws B18.6.2-1972 (R1983)
Machine Screws and Machine Screw Nuts B18.6.3-1972 (R1983)
Metric Thread Forming and Thread Cutting Tapping Screws B18.6.5M-1986
Metric Machine Screws B18.6.7M-1985
Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws (Inch Series) B18.6.4-1981
General Purpose Semi-Tubular Rivets, Full Tubular Rivets, Split Rivets and Rivet Caps B18.7-1972 (R1980)
Metric General Purpose Semi-Tubular Rivets B18.7.1M-1984
Clevis Pins and Cotter Pins B18.8.1-1972 (R1983)
Taper Pins, Dowel Pins, Straight Pins, Grooved Pins, and Spring Pins (Inch Series) B18.8.2-1978
Plow Bolts B18.9-1958 (R1977)
Track Bolts and Nuts B18.10-1982
Miniature Screws B18.11-1961 (R1983)
Glossary of Terms for Mechanical Fasteners B18.12-1962 (R1981)
Screw and Washer Assemblies — Sems B18.13-1965 (R1983)
Forged Eyebolts B18.15-1985
Mechanical and Performance Requirements for Prevailing-Torque Type Steel Metric Hex Nuts and Hex Flange Nuts B18.16.1M-1979 (R1986)
Torque-Tension Test Requirements for Prevailing-Torque Type Steel Metric Hex Nuts and Hex Flange Nuts B18.16.2M-1979 (R1986)
Dimensional Requirements for Prevailing-Torque Type Steel Metric Hex Nuts and Hex Flange Nuts B18.16.3M-1982
Wing Nuts, Thumb Screws, and Wing Screws B18.17-1968 (R1983)
Inspection and Quality Assurance for General Purpose Metric Fasteners B18.18.1M-1982
Inspection and Quality Assurance for High-Volume Machine Assembly Metric Fasteners B18.18.2M-1982
Inspection and Quality Assurance for Special Purpose Metric Fasteners B18.18.3M-1982
Inspection and Quality Assurance for Highly Specialized Engineered Applications — Metric Fasteners B18.18.4M-1982
Lock Washers B18.21.1-1972 (R1983)
Metric Plain Washers B18.22M-1981
Plain Washers B18.22.1-1965 (R1981)
Beveled Washers B18.23.1-1967 (R1975)

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