STD.ASME B18.6.2-ENGL 1998 ■ 0759670 0608543 6T9 ■

ASME B18.6.2-1998
[Revision of ANSI B18.6.2-1972 (R1993)]

SLOTTED HEAD CAP SCREWS, SQUARE HEAD SET SCREWS, AND SLOTTED HEADLESS SET SCREWS (INCH SERIES)

AN AMERICAN NATIONAL STANDARD



The American Society of
Mechanical Engineers

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale



The American Society of Mechanical Engineers

AN AMERICAN NATIONAL STANDARD

SLOTTED HEAD CAP SCREWS, SQUARE HEAD SET SCREWS, AND SLOTTED HEADLESS SET SCREWS (INCH SERIES)

ASME B18.6.2-1998

[Revision of ANSI B18.6.2-1972 (R1993)]

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

Date of Issuance: April 30, 1999

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

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment, which provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not "approve," "rate," or "endorse" any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable Letters Patent, nor assume any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations issued in accordance with governing ASME procedures and policies which preclude the issuance of interpretations by individual volunteers.

No part of this document may be reproduced in any form,
in an electronic retrieval system or otherwise,
without the prior written permission of the publisher.

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

Copyright © 1999 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All Rights Reserved
Printed in U.S.A.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

FOREWORD

(This Foreword is not part of ASME B18.6.2-1998.)

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 American Engineering Standards Committee[1], with the Society of Automotive Engineers and the American Society of Mechanical Engineers as joint sponsors. Subcommittee 3^2 was subsequently established and charged with the responsibility for technical content of standards covering slotted and recessed head screws.

Over the years following the issuance of this document, the need for standards more comprehensive than head configurations became apparent. At a meeting held on April 14, 1942, Subcommittee 3^2 was reorganized and enlarged, and the following operating scope was established.

The scope of Subcommittee 3^2 shall consist of the development and promulgation of American Standards embracing screw products variously known as machine screws, wood screws, tapping screws, slotted head cap screws, slotted headless set screws, and machine screw nuts. The standards shall comprise complete product standards covering all dimensions and tolerances required for the specification and production of the products. Details shall include such boundary dimensions as nut width and thickness; screw head dimensions; slot and recess dimensions; body dimensions; thread classification or thread detail, as required; thread length; point design; chamfers; underhead fillets; and supporting general specifications covering the quality, finish, and the acceptable tolerances and limits as well as any information that may be necessary to ensure satisfactory application of the products. This Standard was developed and declared an American Standard, ASA B18.6, on April 12, 1947.

At the April 1954 meeting, Subcommittee 3^2, contemplating a partial revision of the ASA B18.6 document, recommended the publication of standards for wood screws, cap and set screws, machine screws, and tapping and drive screws in four separate documents, each of which would consist of a complete product specification. This approach was confirmed by the B18 Committee with the further stipulation that the coverage for hexagon head cap screws, square head set screws, and machine screw nuts from the ASA B18.2 standard be transferred to the documents covering cap and set screws and machine screws, respectively. It was understood that jurisdiction over the square head set screws and hexagon head cap screws would remain with Subcommittee 2 and that Subcommittee 3^2 would retain responsibility for machine screw nuts. Following this confirmation and additional direction, proposals for the new documents were prepared.

The proposed standard combining the coverage for hexagon head cap screws and square head set screws from ASA B18.2-1952 with updated specifications for slotted head cap screws and slotted headless screws from B18.6-1947 was developed and found acceptable by both subcommittees. After approval by letter ballot of the B18 Committee and the sponsor organizations, the proposal was submitted to the American Standards Association

[1] As of October 9, 1969, the American Engineering Standards Committee was redesignated the American National Standards Institute, Inc.

[2] As of April 1, 1996, Subcommittee 3 was redesignated Subcommittee 6.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

for recognition. It was formally designated an American Standard, ASA B18.6.2, in June 1956, superseding in part the parent documents.

The document was revised further in 1961. After several years of development, and following approval by letter ballot of the B18 Standards Committee and sponsor organizations, this proposal was submitted to the American National Standards Institute for designation as an American National Standard. This was granted on January 28, 1972.

In 1990 Subcommittee 6 initiated work to revise para. 3.6.1 for square head set screws. Several drafts that were prepared resulted in further refinements for dimensional conformance, designation, and material for all products. These changes were balloted and approved by the ASME B18 Committee. The proposal was submitted to the American National Standards Institute and designated an American National Standard on August 6, 1998.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

ASME B18 STANDARDS COMMITTEE
Standardization of Bolts, Nuts, Rivets, Screws, Washers, and Similar Fasteners

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

OFFICERS

D. A. Clever, *Chair*
R. D. Strong, *Vice Chair*
S. W. Vass, *Vice Chair*
R. L. Crane, *Secretary*

COMMITTEE PERSONNEL

J. C. Akins, Safety Socket Screw Corp.
J. Altman, Rotor Clip Co.
J. H. Slass, *Alternate,* Rotor Clip Co.
J. B. Belford, Lawson Products, Inc.
J. A. Buda, SPS Technologies
D. A. Clever, Deere and Co.
A. P. Cockman, Ford Motor Co.
T. Collier, Cam-Tech Industries, Inc.
R. L. Crane, The American Society of Mechanical Engineers
A. C. DiCola, Wrought Washer Manufacturing, Inc.
A. Dinh, Defense Industrial Supply Center
W. D. Downing, Consultant
B. A. Dusina, Federal Screw Works
D. S. George, Ford Motor Co.
B. Hasiuk, Defense Industrial Supply Center
A. C. Hood, ACH Technologies
J. Hubbard, Rockford Fastener, Inc.
F. W. Kern, The Society of Automotive Engineers
W. H. Kopke, ITW Shakeproof Industrial Products
J. G. Langenstein, Consultant
M. Levinson, ITW Shakeproof Industrial Products
L. L. Lord, Caterpillar, Inc.
A. D. McCrindle, Genfast Manufacturing Co.
K. E. McCullough, Consultant
R. F. Novotny, Textron
M. D. Prasad, General Motors Corp.
W. Schevey, BGM Fastener Co., Inc.
R. D. Strong, General Motors Corp.
J. F. Sullivan, National Fasteners Distribution Association
R. L. Tennis, Caterpillar, Inc.
S. W. Vass, Industrial Fasteners Institute
R. G. Weber, Fairfield University
C. J. Wilson, Industrial Fasteners Institute

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

SUBCOMMITTEE 6 — SLOTTED AND RECESSED HEAD SCREWS

R. D. Strong, *Chair,* General Motors Corp.
D. Broomfield, Illinois Tool Works, Inc.
D. A. Clever, Deere and Co.
A. Dinh, Defense Industrial Supply Center
J. Greenslade, Greenslade and Co.
A. Herskovitz, U.S. Army ARDEC
M. W. Holubecki, Electric Boat Corp.
J. Hubbard, Rockford Fastener, Inc.
R. W. Kerr, Kerr Lakeside, Inc.
R. F. Novotny, Textron
J. A. Schlink, Caterpillar, Inc.
J. F. Sullivan, National Fasteners Distribution Association
C. B. Wackrow, MNP Corp.
C. J. Wilson, Industrial Fasteners Institute

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

CORRESPONDENCE WITH THE B18 COMMITTEE

General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B18 Main Committee
The American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990

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.

Interpretations. Upon request, the B18 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 B18 Main Committee.

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

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

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

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 B18 Main Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B18 Main Committee.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

CONTENTS

Foreword iii
Standards Committee Roster v
Committee Correspondence vii

1 Introductory Notes 1

2 General Data for Slotted Head Cap Screws 2

3 General Data for Square Head Set Screws 11

4 General Data for Slotted Headless Set Screws 13

Tables

1 Dimensions of Slotted Flat Countersunk Head Cap Screws 3
2 Dimensions of Slotted Round Head Cap Screws 4
3 Dimensions of Slotted Fillister Head Cap Screws 5
4 Dimensions of Square Head Set Screws 6
5 Dimensions of Slotted Headless Set Screws 8
6 Length Tolerances: Slotted Head Cap Screws 10
7 Length Tolerances: Square Head Set Screws 12
8 Length Tolerances: Slotted Headless Set Screws 13

Mandatory Appendices

I Thread Runout Sleeve Gages for Slotted Head Cap Screws 17
II Protrusion Gaging of Flat Countersunk Head Cap Screws 19

Nonmandatory Appendices

A Formulas for Dimensions 21
B Wrench Openings for Square Head Set Screws 25

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

SLOTTED HEAD CAP SCREWS, SQUARE HEAD SET SCREWS, AND SLOTTED HEADLESS SET SCREWS (INCH SERIES)

1 INTRODUCTORY NOTES

1.1 Scope

1.1.1 This Standard covers the complete general and dimensional data for the various styles of slotted head cap screws and square head and slotted headless set screws recognized as "American National Standard." Also included are appendices covering thread runout sleeve gages for cap screws, protrusion gaging of flat countersunk head cap screws, formulas on which dimensional data are based, and wrench openings for square head set screws. It should be understood, however, that where questions arise concerning acceptance of a product, the dimensions in the tables shall supersede those recalculated by formula.

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 suppliers concerning the availability of products.

1.2 Slotted Head Cap Screws

The head styles covered by this Standard are enumerated and described as follows:

1.2.1 Flat Countersunk Head. The flat countersunk head has a flat top surface and a conical bearing surface with a head angle of 80–82 deg. Dimensions are given in Table 1.

1.2.2 Round Head. The round head has a semi-elliptical top surface and a flat bearing surface. Dimensions are given in Table 2.

1.2.3 Fillister Head. The fillister head has a rounded top surface, cylindrical sides, and a flat bearing surface. Dimensions are given in Table 3.

1.3 Square Head Set Screws

The square head set screw has threads extending close to the head at one end and a point designed to bear against a mating part at the opposite end. The head has a rounded top surface and four flat sides with an underhead construction that may be flat, conical, or rounded into a relief in the screw shank. Dimensions are given in Table 4.

1.4 Slotted Headless Set Screws

The slotted headless set screw has threads extending over the entire length with a point designed to bear against a mating part at one end and a slot for driving at the opposite end. Dimensions are given in Table 5.

1.5 Referenced Standards

Unless otherwise specified, the referenced standard shall be the most recent issue.

ASME B1.1, Unified Inch Screw Threads (UN and UNR Thread Form)

ASME B1.3M, Screw Thread Gaging Systems for Dimensional Acceptability — Inch and Metric Screw Threads (UN, UNR, UNJ, M, and MJ)

ANSI B18.12, Glossary of Terms for Mechanical Fasteners

ASME B18.18.1M, Inspection and Quality Assurance for General Purpose Fasteners

ASME B18.18.2M, Inspection and Quality Assurance for High Volume Machine Assembly Fasteners

ASME B18.24.1, Part Identifying Number (PIN) Code System Standard for B18 Externally Threaded Products

ASME Y14.5M, Dimensioning and Tolerancing

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

ASTM A 307, Carbon Steel Bolts and Studs, 60000 psi Tensile Strength

ASTM A 354, Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners

ASTM A 380, Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

ASTM A 449, Quenched and Tempered Steel Bolts and Studs

ASTM B 633, Electrodeposited Coatings of Zinc on Iron and Steel

ASTM F 468, Nonferrous Bolts, Hex Cap Screws, and Studs for General Use

ASTM F 593, Stainless Steel Bolts, Hex Cap Screws, and Studs

ASTM F 788/F 788M, Surface Discontinuities of Bolts, Screws, and Studs, Inch and Metric Series

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

SAE J429, Mechanical and Material Requirements of Externally Threaded Fasteners

Publisher: The Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

1.6 Terminology

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

1.7 Dimensions

All dimensions in this Standard are given in inches, unless otherwise stated.

Symbols and terms specifying geometric characteristics are defined in ASME Y14.5M.

1.8 Options

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

2 GENERAL DATA FOR SLOTTED HEAD CAP SCREWS

2.1 Heads

2.1.1 Head Height. All dimensions pertaining to head height specified in the dimensional tables shall be measured parallel to the axis of the screw, and those relating to the top of the head shall represent a metal-to-metal measurement. In other words, any truncation of rounded head contours due to the slot shall not be considered part of the head height.

Total or overall head heights shall be measured from the top of the head to the plane of the bearing surface for fillister and round heads and to the junction of the conical bearing surface with the basic screw diameter for flat countersunk heads. This latter point may not necessarily be the same as the actual junction of head and shank, and the head height is a reference dimension.

Head side heights shall be measured from the intersection of the top surface of the head with the head diameter to the plane of the bearing surface for fillister heads.

2.1.2 Bearing Surface. The bearing surface of round and fillister head cap screws shall be perpendicular to the axis of the screw shank within 2 deg.

2.1.3 Slot Depth. The slot depth in heads of screws shall be measured, parallel to the axis of the screw, from the top of the head to the intersection of the bottom of the slot with the head surface or bearing surface.

2.1.4 Head True Position. The axis of the head on screws shall be located at true position within a tolerance zone having a diameter equal to 4% of the specified maximum head diameter or 0.020 in., whichever is greater, relative to the screw shank, regardless of feature size. The datum shall be determined over a length from the head equal to the basic screw diameter.

2.1.5 Slot True Position. The slot in heads of screws shall be located at true position within a tolerance zone having a width equal to 12% of the basic screw diameter or 0.020 in., whichever is greater, relative to the axis of the screw shank, regardless of feature size. The datum shall be determined over a length from the head equal to the basic screw diameter.

2.2 Length

2.2.1 Measurement. The length of the screw shall be measured, parallel to the axis of the screw, from the extreme point to the plane of the bearing surface for screws having flat-bearing, surface-type heads, and to the intersection of the top surface of the head with the head diameter for screws having countersunk-type heads.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

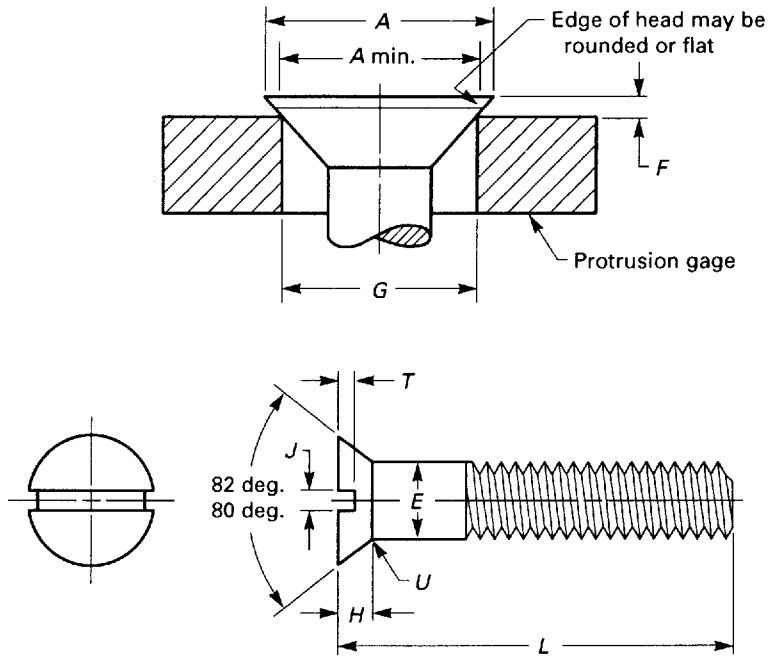


TABLE 1 DIMENSIONS OF SLOTTED FLAT COUNTERSUNK HEAD CAP SCREWS

Nominal Size [Note (1)] or Basic Screw Diameter		Body Diameter, *E*		Head Diameter, *A*		Head Height, *H* [Note (2)]	Slot Width, *J*		Slot Depth, *T*		Fillet Radius, *U*	Protrusion Above Gaging Diameter, *F* [Note (3)]		Gaging Diameter, *G* [Note (3)]
		Max.	Min.	Max., Edge Sharp	Min., Edge Rounded or Flat	Ref.	Max.	Min.	Max.	Min.	Max.	Max.	Min.	
1/4	0.2500	0.2500	0.2450	0.500	0.452	0.140	0.075	0.064	0.068	0.045	0.100	0.046	0.030	0.424
5/16	0.3125	0.3125	0.3070	0.625	0.567	0.177	0.084	0.072	0.086	0.057	0.125	0.053	0.035	0.538
3/8	0.3750	0.3750	0.3690	0.750	0.682	0.210	0.094	0.081	0.103	0.068	0.150	0.060	0.040	0.651
7/16	0.4375	0.4375	0.4310	0.812	0.736	0.210	0.094	0.081	0.103	0.068	0.175	0.065	0.044	0.703
1/2	0.5000	0.5000	0.4930	0.875	0.791	0.210	0.106	0.091	0.103	0.068	0.200	0.071	0.049	0.756
9/16	0.5625	0.5625	0.5550	1.000	0.906	0.244	0.118	0.102	0.120	0.080	0.225	0.078	0.054	0.869
5/8	0.6250	0.6250	0.6170	1.125	1.020	0.281	0.133	0.116	0.137	0.091	0.250	0.085	0.058	0.982
3/4	0.7500	0.7500	0.7420	1.375	1.251	0.352	0.149	0.131	0.171	0.115	0.300	0.099	0.068	1.208
7/8	0.8750	0.8750	0.8660	1.625	1.480	0.423	0.167	0.147	0.206	0.138	0.350	0.113	0.077	1.435
1	1.0000	1.0000	0.9900	1.875	1.711	0.494	0.188	0.166	0.240	0.162	0.400	0.127	0.087	1.661
1 1/8	1.1250	1.1250	1.1140	2.062	1.880	0.529	0.196	0.178	0.257	0.173	0.450	0.141	0.096	1.826
1 1/4	1.2500	1.2500	1.2390	2.312	2.110	0.600	0.211	0.193	0.291	0.197	0.500	0.155	0.105	2.052
1 3/8	1.3750	1.3750	1.3630	2.562	2.340	0.665	0.226	0.208	0.326	0.220	0.550	0.169	0.115	2.279
1 1/2	1.5000	1.5000	1.4880	2.812	2.570	0.742	0.258	0.240	0.360	0.244	0.600	0.183	0.124	2.505

GENERAL NOTE: For additional requirements refer to Section 2, titled General Data for Slotted Head Cap Screws.

NOTES:

(1) Where specifying nominal size in decimals, zeros preceding the decimal and in the fourth decimal place shall be omitted.

(2) Tabulated values were determined from the formula for maximum *H* (Appendix A).

(3) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from the tabulated value, the protrusion will be affected accordingly, and the proper protrusion values shall be recalculated using the formulas shown in Appendix II.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

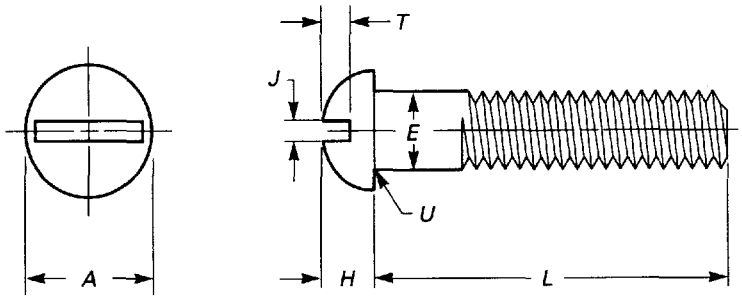


TABLE 2 DIMENSIONS OF SLOTTED ROUND HEAD CAP SCREWS

Nominal Size [Note (1)] or Basic Diameter		Body Diameter, *E*		Head Diameter, *A*		Head Height, *H*		Slot Width, *J*		Slot Depth, *T*		Fillet Radius, *U*	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1/4	0.2500	0.2500	0.2450	0.437	0.418	0.191	0.175	0.075	0.064	0.117	0.097	0.031	0.016
5/16	0.3125	0.3125	0.3070	0.562	0.540	0.245	0.226	0.084	0.072	0.151	0.126	0.031	0.016
3/8	0.3750	0.3750	0.3690	0.625	0.603	0.273	0.252	0.094	0.081	0.168	0.138	0.031	0.016
7/16	0.4375	0.4375	0.4310	0.750	0.725	0.328	0.302	0.094	0.081	0.202	0.167	0.047	0.016
1/2	0.5000	0.5000	0.4930	0.812	0.786	0.354	0.327	0.106	0.091	0.218	0.178	0.047	0.016
9/16	0.5625	0.5625	0.5550	0.937	0.909	0.409	0.378	0.118	0.102	0.252	0.207	0.047	0.016
5/8	0.6250	0.6250	0.6170	1.000	0.970	0.437	0.405	0.133	0.116	0.270	0.220	0.062	0.031
3/4	0.7500	0.7500	0.7420	1.250	1.215	0.546	0.507	0.149	0.131	0.338	0.278	0.062	0.031

GENERAL NOTE: For additional requirements refer to Section 2, titled General Data for Slotted Head Cap Screws.

NOTE:
(1) Where specifying nominal size in decimals, zeros preceding the decimal and in the fourth decimal place shall be omitted.

2.2.2 Length Tolerance. The length tolerance for slotted head cap screws shall be as tabulated in Table 6.

2.3 Threads

2.3.1 Thread Series and Class. The threads on cap screws shall be Unified Inch coarse, fine, or 8 thread series, Class 2A, in accordance with ASME B1.1. When rolled, threads shall be UNRC, UNRF, or 8 UNR Series. Threads produced by other methods may be UNC, UNF, or 8 UN. For threads with additive finish, the size limits of Class 2A apply before coating, and the thread after coating is subject to acceptance using a basic Class 3A size GO thread gage and a Class 2A thread gage for either minimum material or NOT GO.

2.3.2 Thread Gaging. Unless otherwise specified, dimensional acceptability of screw threads shall be determined based on System 21, ASME B1.3M.

2.4 Thread Length

The complete (full-form) thread length on cap screws shall be equal to twice the basic screw diameter plus 0.250 in. with a plus tolerance of 0.188 in. or an amount equal to $2\frac{1}{2}$ times the pitch of the thread, whichever is greater. Cap screws of lengths too short to accommodate the minimum thread length shall have full-form threads extending to within $2\frac{1}{2}$ pitches (threads) of the head as measured, parallel to the axis of the screw, from the bearing surface of the head to the face of a non-counterbored, non-countersunk standard GO thread ring gage assembled by hand as far as the thread will permit.

2.5 Total Thread Runout

The total thread runout (eccentricity and angularity) in relation to the body shall be such that for sizes up to and including 3/4 (0.750) in., slotted head cap screws

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

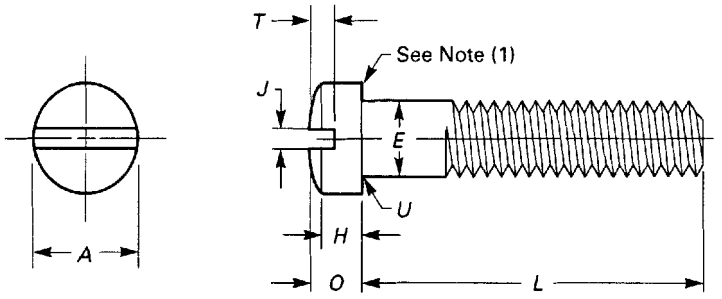


TABLE 3 DIMENSIONS OF SLOTTED FILLISTER HEAD CAP SCREWS

Nominal Size [Note (2)] or Basic Screw Diameter		Body Diameter, E		Head Diameter, A		Head Side Height, H		Total Head Height, O		Slot Width, J		Slot Depth, T		Fillet Radius, U	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1/4	0.2500	0.2500	0.2450	0.375	0.363	0.172	0.157	0.216	0.194	0.075	0.064	0.097	0.077	0.031	0.016
5/16	0.3125	0.3125	0.3070	0.437	0.424	0.203	0.186	0.253	0.230	0.084	0.072	0.115	0.090	0.031	0.016
3/8	0.3750	0.3750	0.3690	0.562	0.547	0.250	0.229	0.314	0.284	0.094	0.081	0.142	0.112	0.031	0.016
7/16	0.4375	0.4375	0.4310	0.625	0.608	0.297	0.274	0.368	0.336	0.094	0.081	0.168	0.133	0.047	0.016
1/2	0.5000	0.5000	0.4930	0.750	0.731	0.328	0.301	0.413	0.376	0.106	0.091	0.193	0.153	0.047	0.016
9/16	0.5625	0.5625	0.5550	0.812	0.792	0.375	0.346	0.467	0.427	0.118	0.102	0.213	0.168	0.047	0.016
5/8	0.6250	0.6250	0.6170	0.875	0.853	0.422	0.391	0.521	0.478	0.133	0.116	0.239	0.189	0.062	0.031
3/4	0.7500	0.7500	0.7420	1.000	0.976	0.500	0.466	0.612	0.566	0.149	0.131	0.283	0.223	0.062	0.031
7/8	0.8750	0.8750	0.8660	1.125	1.098	0.594	0.556	0.720	0.668	0.167	0.147	0.334	0.264	0.062	0.031
1	1.0000	1.0000	0.9900	1.312	1.282	0.656	0.612	0.803	0.743	0.188	0.166	0.371	0.291	0.062	0.031

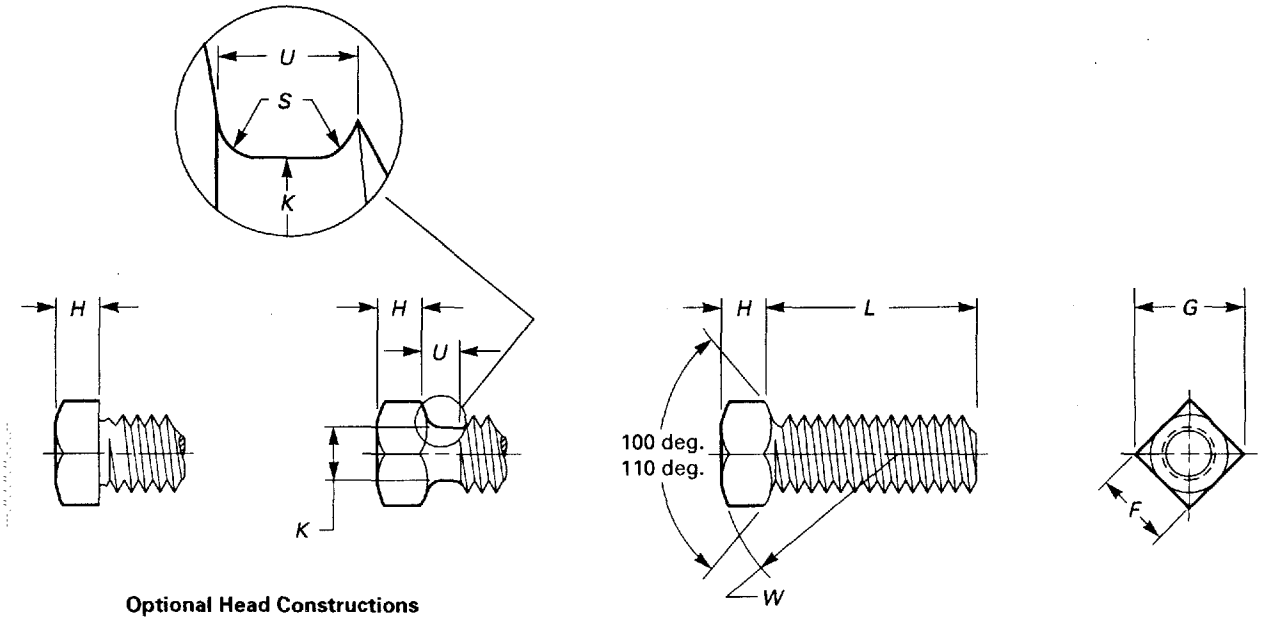
GENERAL NOTE: For additional requirements refer to Section 2, titled General Data for Slotted Head Cap Screws.

NOTES:

(1) A light rounding of the edges at the periphery of the head shall be permissible provided the diameter of the bearing circle is equal to no less than 90% of the specified minimum head diameter.

(2) Where specifying nominal size in decimals, zeros preceding the decimal and in the fourth decimal place shall be omitted.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale



Optional Head Constructions

TABLE 4 DIMENSIONS OF SQUARE HEAD SET SCREWS

Nominal Size [Note (1)] or Basic Screw Diameter		Width Across Flats, *F*		Width Across Corners, *G*		Head Height, *H*		Neck Relief Diameter, *K*		Neck Relief Fillet Radius, *S*	Neck Relief Width, *U*	Head Radius, *W*
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.
10	0.1900	0.188	0.180	0.265	0.247	0.148	0.134	0.145	0.140	0.027	0.083	0.48
1/4	0.2500	0.250	0.241	0.354	0.331	0.196	0.178	0.185	0.170	0.032	0.100	0.62
5/16	0.3125	0.312	0.302	0.442	0.415	0.245	0.224	0.240	0.225	0.036	0.111	0.78
3/8	0.3750	0.375	0.362	0.530	0.497	0.293	0.270	0.294	0.279	0.041	0.125	0.94
7/16	0.4375	0.438	0.423	0.619	0.581	0.341	0.315	0.345	0.330	0.046	0.143	1.09
1/2	0.5000	0.500	0.484	0.707	0.665	0.389	0.361	0.400	0.385	0.050	0.154	1.25
9/16	0.5625	0.562	0.545	0.795	0.748	0.437	0.407	0.454	0.439	0.054	0.167	1.41
5/8	0.6250	0.625	0.606	0.884	0.833	0.485	0.452	0.507	0.492	0.059	0.182	1.56
3/4	0.7500	0.750	0.729	1.060	1.001	0.582	0.544	0.620	0.605	0.065	0.200	1.88
7/8	0.8750	0.875	0.852	1.237	1.170	0.678	0.635	0.731	0.716	0.072	0.222	2.19
1	1.0000	1.000	0.974	1.414	1.337	0.774	0.726	0.838	0.823	0.081	0.250	2.50
1 1/8	1.1250	1.125	1.096	1.591	1.505	0.870	0.817	0.939	0.914	0.092	0.283	2.81
1 1/4	1.2500	1.250	1.219	1.768	1.674	0.966	0.908	1.064	1.039	0.092	0.283	3.12
1 3/8	1.3750	1.375	1.342	1.945	1.843	1.063	1.000	1.159	1.134	0.109	0.333	3.44
1 1/2	1.5000	1.500	1.464	2.121	2.010	1.159	1.091	1.284	1.759	0.109	0.333	3.75

GENERAL NOTE: For additional requirements refer to Section 3, titled General Data for Square Head Set Screws.

NOTE:

(1) Where specifying nominal size in decimals, zeros preceding the decimal and in the fourth decimal place shall be omitted.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

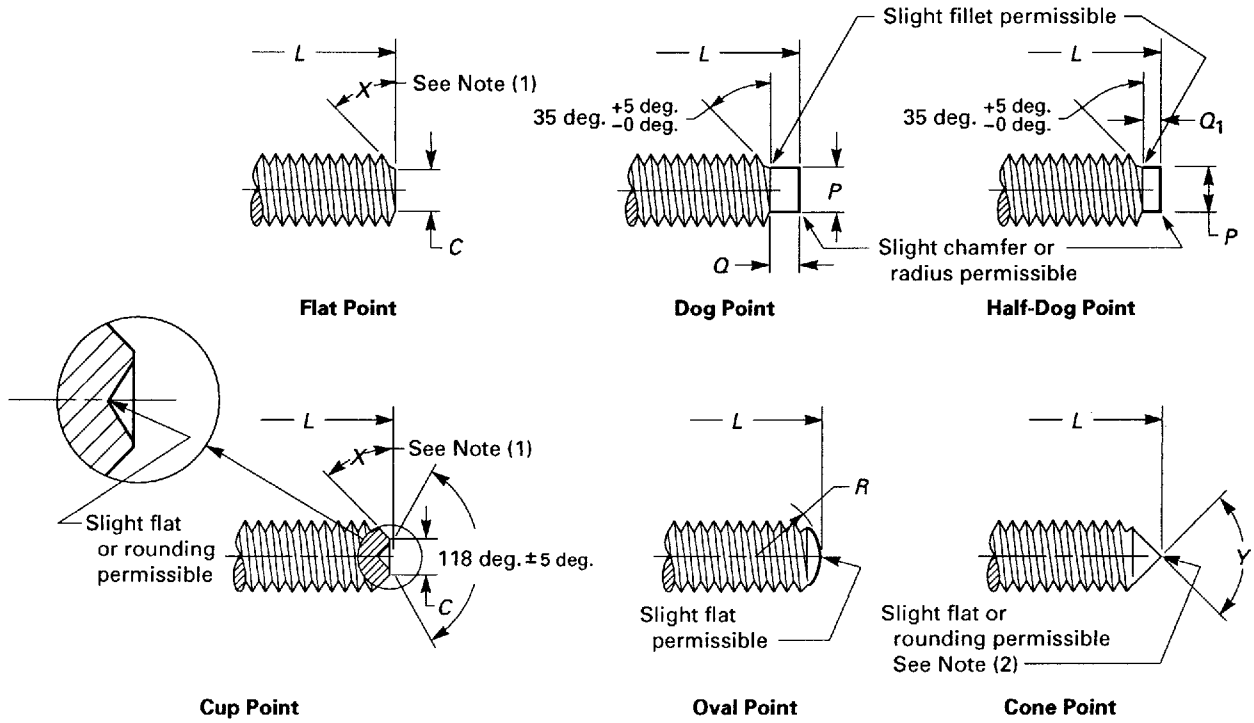


TABLE 4 DIMENSIONS OF SQUARE HEAD SET SCREWS (CONT'D)

Nominal Size [Note (3)] or Basic Screw Diameter		Cup and Flat Point Diameters, *C*		Dog and Half-Dog Point Diameters, *P*		Point Length				Oval Point Radius, *R*	Cone Point Angle: 90 deg. ± 2 deg. for These Nominal Lengths or Longer; 118 deg. ± 2 deg. for Shorter Screws, *Y*
						Dog, *Q*		Half-Dog, Q_1		+0.031 −0.000	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.		
10	0.1900	0.102	0.088	0.127	0.120	0.095	0.085	0.050	0.040	0.142	1/4
1/4	0.2500	0.132	0.118	0.156	0.149	0.130	0.120	0.068	0.058	0.188	5/16
5/16	0.3125	0.172	0.156	0.203	0.195	0.161	0.151	0.083	0.073	0.234	3/8
3/8	0.3750	0.212	0.194	0.250	0.241	0.193	0.183	0.099	0.089	0.281	7/16
7/16	0.4375	0.252	0.232	0.297	0.287	0.224	0.214	0.114	0.104	0.328	1/2
1/2	0.5000	0.291	0.270	0.344	0.334	0.255	0.245	0.130	0.120	0.375	9/16
9/16	0.5625	0.332	0.309	0.391	0.379	0.287	0.275	0.146	0.134	0.422	5/8
5/8	0.6250	0.371	0.347	0.469	0.456	0.321	0.305	0.164	0.148	0.469	3/4
3/4	0.7500	0.450	0.425	0.562	0.549	0.383	0.367	0.196	0.180	0.562	7/8
7/8	0.8750	0.530	0.502	0.656	0.642	0.446	0.430	0.227	0.211	0.656	1
1	1.0000	0.609	0.579	0.750	0.734	0.510	0.490	0.260	0.240	0.750	1 1/8
1 1/8	1.1250	0.689	0.655	0.844	0.826	0.572	0.552	0.291	0.271	0.844	1 1/4
1 1/4	1.2500	0.767	0.733	0.938	0.920	0.635	0.615	0.323	0.303	0.938	1 1/2
1 3/8	1.3750	0.848	0.808	1.031	1.011	0.698	0.678	0.354	0.334	1.031	1 5/8
1 1/2	1.5000	0.926	0.886	1.125	1.105	0.760	0.740	0.385	0.365	1.125	1 3/4

GENERAL NOTE: For additional requirements refer to Section 3, titled General Data for Square Head Set Screws.

NOTES:
(1) Point angle X shall be 45 deg. plus 5 deg., minus 0 deg. for screws of nominal lengths equal to or longer than those listed for variable *Y*, and 30 deg. minimum for screws of shorter nominal lengths.
(2) The extent of rounding or flat at the apex of the cone point shall not exceed an amount equivalent to 10% of the basic screw diameter.
(3) Where specifying nominal size in decimals, zeros preceding the decimal and in the fourth decimal place shall be omitted.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

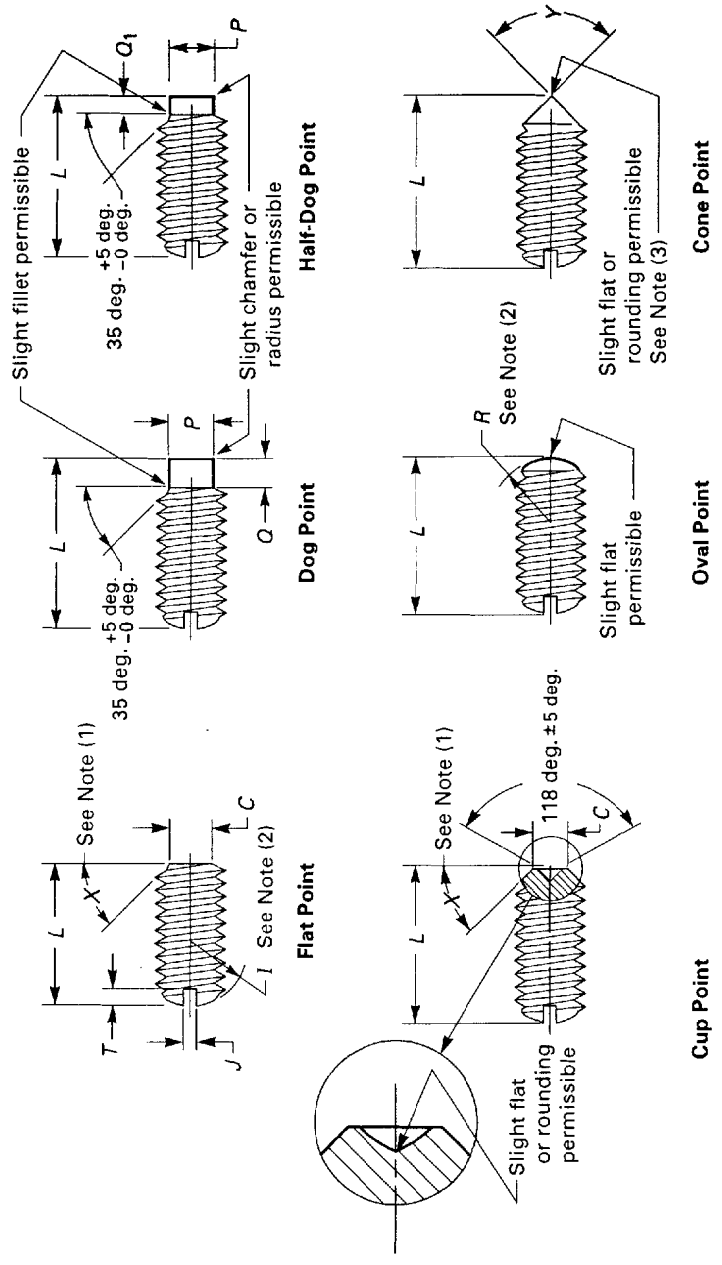


TABLE 5 ILLUSTRATION

Not for Resale

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

TABLE 5 DIMENSIONS OF SLOTTED HEADLESS SET SCREWS

Nominal Size [Note (4)] or Basic Screw Diameter		Crown Radius, *I* [Note (2)]	Slot Width, *J*		Slot Depth, *T*		Cup and Flat Point Diameters, *C*		Dog Point Diameters, *P*		Point Length				Oval Point Radius, *R* [Note (2)]	Cone Point Angle: deg. ± 2 deg. for These Nominal Lengths or Longer; 118 deg. ± 2 deg. for Shorter Screws, *Y*
											Dog, *Q*		Half-Dog, Q_1			
		Basic	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Basic	
0	0.0600	0.060	0.014	0.010	0.020	0.016	0.033	0.027	0.040	0.037	0.032	0.028	0.017	0.013	0.045	5/64
1	0.0730	0.073	0.016	0.012	0.020	0.016	0.040	0.033	0.049	0.045	0.040	0.036	0.021	0.017	0.055	3/32
2	0.0860	0.086	0.018	0.014	0.025	0.019	0.047	0.039	0.057	0.053	0.046	0.042	0.024	0.020	0.064	7/64
3	0.0990	0.099	0.020	0.016	0.028	0.022	0.054	0.045	0.066	0.062	0.052	0.048	0.027	0.023	0.074	1/8
4	0.1120	0.112	0.024	0.018	0.031	0.025	0.061	0.051	0.075	0.070	0.058	0.054	0.030	0.026	0.084	5/32
5	0.1250	0.125	0.026	0.020	0.036	0.026	0.067	0.057	0.083	0.078	0.063	0.057	0.033	0.027	0.094	3/16
6	0.1380	0.138	0.028	0.022	0.040	0.030	0.074	0.064	0.092	0.087	0.073	0.067	0.038	0.032	0.104	3/16
8	0.1640	0.164	0.032	0.026	0.046	0.036	0.087	0.076	0.109	0.103	0.083	0.077	0.043	0.037	0.123	1/4
10	0.1900	0.190	0.035	0.029	0.053	0.043	0.102	0.088	0.127	0.120	0.095	0.085	0.050	0.040	0.142	1/4
12	0.2160	0.216	0.042	0.035	0.061	0.051	0.115	0.101	0.144	0.137	0.115	0.105	0.060	0.050	0.162	5/16
1/4	0.2500	0.250	0.049	0.041	0.068	0.058	0.132	0.118	0.156	0.149	0.130	0.120	0.068	0.058	0.188	5/16
5/16	0.3125	0.312	0.055	0.047	0.083	0.073	0.172	0.156	0.203	0.195	0.161	0.151	0.083	0.073	0.234	3/8
3/8	0.3750	0.375	0.068	0.060	0.099	0.089	0.212	0.194	0.250	0.241	0.193	0.183	0.099	0.089	0.281	7/16
7/16	0.4375	0.438	0.076	0.068	0.114	0.104	0.252	0.232	0.297	0.287	0.224	0.214	0.114	0.104	0.328	1/2
1/2	0.5000	0.500	0.086	0.076	0.130	0.120	0.291	0.270	0.344	0.334	0.255	0.245	0.130	0.120	0.375	9/16
9/16	0.5625	0.562	0.096	0.086	0.146	0.136	0.332	0.309	0.391	0.379	0.287	0.275	0.146	0.134	0.422	5/8
5/8	0.6250	0.625	0.107	0.097	0.161	0.151	0.371	0.347	0.469	0.456	0.321	0.305	0.164	0.148	0.469	3/4
3/4	0.7500	0.750	0.134	0.124	0.193	0.183	0.450	0.425	0.562	0.549	0.383	0.367	0.196	0.180	0.562	7/8

GENERAL NOTES:
(a) For reference, see Table 5 illustration on page 8.
(b) For additional requirements refer to Section 4, titled General Data for Slotted Headless Set Screws.

NOTES:
(1) Point angle X shall be 45 deg. plus 5 deg., minus 0 deg. for screws of nominal lengths equal to or longer than those listed for variable *Y*, and 30 deg. minimum for screws of shorter nominal lengths.
(2) Tolerance on radius for nominal sizes up to and including 5 (0.125 in.) shall be plus 0.015 in., minus 0.000 and for larger sizes, plus 0.031 in., minus 0.000. Slotted ends on screws may be flat at the option of the manufacturer.
(3) The extent of rounding or flat at the apex of the cone point shall not exceed an amount equivalent to 10% of the basic screw diameter.
(4) Where specifying nominal size in decimals, zeros preceding the decimal and in the fourth decimal place shall be omitted.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

TABLE 6 LENGTH TOLERANCES: SLOTTED HEAD CAP SCREWS

Nominal Screw Length	Nominal Screw Size		
	1/4 (0.250) through 3/8 (0.375)	7/16 (0.4375) through 3/4 (0.750)	7/8 (0.875) through 1/2 (1.500)
	Length Tolerance		
Through 1 (1.00)	−0.03	−0.03	−0.05
Over 1 (1.00) through 2½ (2.50)	−0.04	−0.06	−0.10
Over 2½ (2.50) through 6 (6.00)	−0.06	−0.08	−0.14
Over 6 (6.00)	−0.12	−0.12	−0.20

shall screw at least two threads into a tapped hole counterbored to provide 0.031 in. of diametral clearance over the maximum body diameter, to a depth equal to the length of the gage shown in Appendix I. The tapped hole shall have Class 2B maximum pitch diameter, and the starting thread shall be countersunk to the diameter of the counterbore. The inspection fixture shall be hardened. For screw sizes over ¾ (0.750) in., the diametral clearance of the counterbore shall be 0.062 in.

2.6 Points

The end of cap screws shall be flat and chamfered from a diameter approximately 0.016 in. below the thread minor diameter to produce a length of chamfered or partial thread equivalent to ½ to 1½ times the pitch of the thread.

2.7 Material

2.7.1 Steel. Unless otherwise specified, chemical and mechanical properties of steel slotted head cap screws shall conform to Grade A of ASTM A 307 or Grade 2 of SAE J429, or free machining steel meeting the mechanical properties of either of the previously mentioned materials.

Where so specified by the purchaser, screws may also be furnished conforming to Type 1 or 2 of ASTM A 449, to Grade 5 or 5.2 of SAE J429, to Grade BD of ASTM A 354, or to Grade 8 or 8.2 of SAE J429.

2.7.2 Other Materials. Nonferrous materials are covered in ASTM F 468. Corrosion-resistant steels are covered in ASTM F 593.

2.8 Finishes

Unless otherwise specified, slotted head cap screws shall be supplied with a natural (as processed) finish, unplated or uncoated.

2.9 Workmanship

Slotted head cap screws shall be free from burrs, seams, laps, loose scale, and other surface irregularities that could affect their serviceability.

When control of surface discontinuities is required, the purchaser shall specify conformance to ASTM F 788/F 788M.

2.10 Quality Assurance

Unless otherwise specified, acceptability of slotted head cap screws shall be determined in accordance with ASME B18.18.1M.

2.11 Dimensional Conformance

Products shall conform to the dimensions indicated in the applicable tables. Unless otherwise specified, the following provisions shall apply for inspection of dimensional characteristics.

2.11.1 The following designated dimensional characteristics shall be inspected to the inspection levels shown according to ASME B18.18.2M and shall be within their specified limits:

Designated Characteristic	Inspection Level
Thread acceptability	C
Body diameter, *E*	C
Protrusion, *F* (of countersunk head)	C
Thread length	C
Screw length, *L*	C
Visual inspection (shall include fillet and workmanship)	C

If verifiable in-process inspection is used, inspection sample sizes and reporting shall be in accordance with the applicable ASME, ASTM, or SAE quality system consensus standard.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

2.11.2 For nondesignated dimensional characteristics, the provisions of ASME B18.18.1M shall apply. If a nondesignated dimension is determined to be outside its specified limits, it shall be deemed conforming to this Standard if the user who is the installer accepts the dimension, based on form, fit, and function considerations.

2.12 Designation

Slotted head cap screws shall be designated by the following data, preferably in the sequence shown: product name; nominal size (fraction or decimal equivalent); threads per inch; screw length (fraction or decimal equivalent); material; protective finish, if required; or, optionally, ASME B18.24.1 PIN code. See examples below:

EXAMPLES:

(1) Slotted Round Head Cap Screw, $\frac{1}{2}$ – 13 × 3, SAE Grade 2, Zinc plated per ASTM B 633, Fe/Zn 5 type II.

(2) Slotted Flat Countersunk Head Cap Screw, 0.750 – 16 × 2.25, ASTM F 593 Alloy Group I. S620NA39FAR26593A1AB1.

3 GENERAL DATA FOR SQUARE HEAD SET SCREWS

3.1 Heads

3.1.1 Head Height. The head height specified on the dimensional table is measured, parallel to the axis of the screw, from the top of the head to the intersection of the side of the head with the undersurface.

3.1.2 Width Across Flats. The maximum width across flats shall not be exceeded. On milled-from-bar, non-ferrous screws, however, the maximum limit may conform to commercial tolerances of the bar stock material. No transverse section through the head height shall be less than the specified minimum width across flats.

3.1.3 Head True Position. The axis of the head shall be located at true position within a tolerance zone having a diameter equal to 6% of the specified maximum width across flats of the head, relative to the axis of the screw shank, regardless of feature size. The datum shall be determined over a length from the head equal to the basic screw diameter.

3.2 Length

3.2.1 Measurement. The length of square head set screws shall be measured parallel to the axis of the screw from the intersection of the side of the head with the undersurface to the extreme point.

3.2.2 Length Tolerance. The length tolerance for square head set screws shall be as tabulated in Table 7.

3.3 Threads

3.3.1 Thread Series and Class. The threads on square head set screws shall be Unified Inch coarse, fine, or 8 thread series, Class 2A, in accordance with ASME B1.1. For threads with additive finish, the size limits of Class 2A apply before coating, and the thread after coating is subject to acceptance using a basic Class 3A size GO thread gage and a Class 2A thread gage for either minimum material or NOT GO.

3.3.2 Thread Gaging. Unless otherwise specified, dimensional acceptability of screw threads shall be determined based on System 21, ASME B1.3M.

3.4 Thread Length

Square head set screws shall have complete (full-form) threads extending over the portion of the screw length that is not affected by the point. For the respective constructions, threads shall extend into the neck relief, to the conical underside of head, or to within one thread (as measured with a thread ring gage) from the flat underside of the head. Threads through angular or crowned portions of points shall have fully formed roots with partial crests.

Because standard thread gages provide only for lengths of engagement up to $1\frac{1}{2}$ times the basic screw diameter, changes in pitch diameter of either or both the external and internal thread may be required for applications involving longer lengths of engagement.

3.5 Points

3.5.1 Point Types. Unless otherwise specified, square head set screws shall be supplied with cup points. Cup points as furnished by some manufacturers may be externally or internally knurled. Where so specified by the purchaser, screws shall have cone, dog, half-dog, flat, or oval points conforming to specifications in Table 4.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

TABLE 7 LENGTH TOLERANCES: SQUARE HEAD SET SCREWS

	Nominal Screw Size	
	10 (0.190) through $^5/_8$ (0.625)	$^3/_4$ (0.750) through $1^1/_2$ (1.500)
Nominal Screw Length	Length Tolerance	
Through 1 (1.00)	−0.03	−0.06
Over 1 (1.00) through 2 (2.00)	−0.06	−0.12
Over 2 (2.00)	−0.09	−0.18

3.5.2 Point Angles. The external point angles specified shall apply only to the portions of the point that lie below the thread root diameter, as angles within the thread profile may vary due to manufacturing processes.

3.5.3 Dog Points. Dog points are not supplied on screws where the length of usable (effective) thread is less than the basic screw diameter. Half-dog points should be specified for such screw lengths.

3.5.3.1 Point True Position. The axis of the dog of half-dog points shall be at true position with respect to the axis of the thread within a tolerance zone having a diameter of 0.010 in. for sizes up to and including $^3/_4$ (0.750) in. and a diameter of 0.020 in. for larger sizes, regardless of feature size.

3.6 Material

Unless otherwise specified by the purchaser, square head set screws shall be made from case hardened steel or through hardened steel as follows, at the option of the supplier.

3.6.1 Case Hardened Steel. Unless otherwise specified, case hardened steel square head set screws shall be low carbon steel, case hardened to 83 HR15N minimum, with the following case depth:

Diameter		Case Depth
No. 10	0.190	0.004–0.009
$^1/_4$–$1^1/_2$	0.250–1.500	0.006 min.

3.6.2 Through Hardened Steel. Unless otherwise specified, through hardened steel square head set screws shall be alloy steel, quenched, and tempered to a hardness of 45–53 HRC (450–560 HV or 428–532 HB), with a surface hardness at least equal to the core hardness, but not exceeding 88 HR15N.

3.6.3 Other Materials. Where so specified by the purchaser, square head set screws may be made from corrosion resistant steel or nonferrous metals. The materials and properties shall be as agreed upon between the manufacturer and purchaser.

3.7 Finish

Unless otherwise specified, set screws shall be supplied with a natural (as processed) finish, unplated or uncoated.

3.8 Workmanship

Square head set screws shall be free from burrs, seams, laps, loose scale, and any other defects that could affect their serviceability.

3.9 Quality Assurance

Unless otherwise specified, acceptability of square head set screws shall be determined in accordance with ASME B18.18.1M.

3.10 Dimensional Conformance

Products shall conform to the dimensions indicated in the respective tables. Unless otherwise specified, the following provisions shall apply for inspection of dimensional characteristics.

3.10.1 The following dimensional characteristics shall be inspected to the inspection levels shown according to ASME B18.18.2M and shall be within their specified limits:

Designated Characteristic	Inspection Level
Thread acceptability	C
Head width across corners	C
Screw length, L	C
Visual inspection (shall include fillet and workmanship)	C

If verifiable in-process inspection is used, inspection sample sizes and reporting shall be in accordance with the applicable ASME, ASTM, or SAE quality system consensus standard.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

3.10.2 For nondesignated dimensional characteristics, the provisions of ASME B18.18.1M shall apply. If a nondesignated dimension is determined to be outside its specified limits, it shall be deemed conforming to this Standard if the user who is the installer accepts the dimension, based on form, fit, and function considerations.

3.11 Designation

Square head set screws shall be designated by the following data, preferably in the sequence shown: product name; nominal size (number, fraction, or decimal equivalent); threads per inch; screw length (fraction or decimal equivalent); point style; material; protective finish, if required; or optionally, ASME B18.24.1 PIN code. See examples below:

EXAMPLES:

(1) Square Head Set Screw, $\frac{1}{4}$ – 20 × $\frac{3}{4}$, Flat Point, Steel, Zinc plated per ASTM B 633 Fe/Zn 5 type II, S620NB35CAD14155NNCE1.

(2) Square Head Set Screw, 0.250 – 20 × 0.75, Cup Point, Through Hardened Steel, Zinc plated per ASTM B 633 Fe/Zn 5 type II, S620NB33CAD14303NNCE1.

(3) Square Head Set Screw, 0.500 – 13 × 1.25, Cone Point, 303 Corrosion Resistant Steel, Hardness 70 – 95 HRB, Passivated per ASTM A 380, S620NB34CAM19406NNAB1.

4 GENERAL DATA FOR SLOTTED HEADLESS SET SCREWS

4.1 Headless Ends

4.1.1 End Configuration. The slotted end of screws may be crowned as depicted and dimensioned in Table 5 or may be flat, at the option of the manufacturer.

4.1.2 Slot Depth. The slot depth in slotted headless set screws shall be measured, parallel to the axis of the screw, from the end of the screw to the intersection of the bottom of the slot with the thread major diameter.

4.1.3 Slot True Position. The slot in slotted headless set screws shall be located at true position relative to the axis of the thread within a tolerance zone having a width equal to 12% of the basic screw diameter or to 0.020 in., whichever is greater, regardless of feature size.

TABLE 8 LENGTH TOLERANCES: SLOTTED HEADLESS SET SCREWS

Nominal Screw Length	Length Tolerance
Through 1 (1.00)	−0.03
Over 1 (1.00) through 2 (2.00)	−0.06
Over 2 (2.00)	−0.09

4.2 Length

4.2.1 Measurement. The length of headless set screws shall be measured overall, parallel to the axis of the screw.

4.2.2 Length Tolerance. The length tolerance for slotted headless set screws shall be as tabulated in Table 8.

4.3 Threads

4.3.1 Thread Series and Class. The threads on slotted headless set screws shall be Unified Inch coarse, fine, or 8 thread series, Class 2A, in accordance with ASME B1.1. For threads with additive finish, the size limits of Class 2A apply before coating, and the thread after coating is subject to acceptance using a basic Class 3A size GO thread gage and a Class 2A thread gage for either minimum material or NOT GO.

4.3.2 Thread Gaging. Unless otherwise specified, dimensional acceptability of screw threads shall be determined based on System 21, ASME B1.3M.

4.4 Thread Length

Slotted headless set screws shall have complete (full-form) threads extending over the portion of the screw length that is not affected by the point or the crown on the headless end. Threads through angular or crowned portions of length shall have fully formed roots with partial crests.

Because standard thread gages provide only for lengths of engagement up to $1\frac{1}{2}$ times the basic screw diameter, changes in the pitch diameter of either or both the external and internal thread may be required for applications involving longer lengths of engagement.

4.5 Points

4.5.1 Point Types. Unless otherwise specified, slotted headless set screws shall be supplied with cup points. Where so specified by the purchaser, screws shall have cone, dog, half-dog, flat, or oval points conforming to specifications in Table 5.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

4.5.2 Point Angles. The external point angles specified shall apply only to the portions of the point that lie below the thread root diameter, as angles within the thread profile may vary due to manufacturing processes.

4.5.3 Dog Points. Dog points are not supplied on screws where the length of usable (effective) thread is less than the basic screw diameter. Half-dog points should be specified for such screw lengths.

4.5.3.1 Point True Position. The axis of the dog or half-dog points shall be located at true position with respect to the axis of the thread within a tolerance zone equal to 6% of the basic screw diameter or 0.010 in., whichever is less, regardless of feature size.

4.6 Material

Unless otherwise specified by the purchaser, slotted headless set screws shall be made from case hardened steel or through hardened steel as follows, at the option of the supplier.

4.6.1 Case Hardened Steel. Unless otherwise specified, case hardened steel slotted headless set screws shall be low carbon steel, case hardened to 83 HR15N minimum, with the following case depth:

Diameter		Case Depth
Nos. 2–6	0.086–0.138	0.002–0.007
Nos. 8–12	0.164–0.216	0.004–0.009
1/4–3/4	0.250–0.750	0.006 min.

4.6.2 Through Hardened Steel. Unless otherwise specified, through hardened steel slotted headless set screws shall be alloy steel, quenched, and tempered to a hardness of 45–53 HRC (450–560 HV or 428–532 HB), with a surface hardness at least equal to the core hardness, but not exceeding 88 HR15N.

4.6.3 Other Materials. Where so specified by the purchaser, slotted headless set screws may be made from corrosion resistant steel or nonferrous metals. The materials and properties shall be as agreed upon between the manufacturer and purchaser.

4.7 Finish

Unless otherwise specified, set screws shall be supplied with a natural (as processed) finish, unplated or uncoated.

4.8 Workmanship

Slotted headless set screws shall be free from burrs, seams, laps, loose scale, and other surface irregularities that may affect their serviceability.

4.9 Quality Assurance

Unless otherwise specified, acceptability of slotted headless set screws shall be determined in accordance with ASME B18.18.1M.

4.10 Dimensional Conformance

Products shall conform to the dimensions indicated in the respective tables. Unless otherwise specified, the following provisions shall apply for inspection of dimensional characteristics.

4.10.1 The following designated dimensional characteristics shall be inspected to the inspection levels shown according to ASME B18.18.2M and shall be within their specified limits:

Designated Characteristic	Inspection Level
Thread acceptability	C
Screw length, *L*	C
Visual inspection	C

If verifiable in-process inspection is used, inspection sample sizes and reporting shall be in accordance with the applicable ASME, ASTM, or SAE quality system consensus standard.

4.10.2 For nondesignated dimensional characteristics, the provisions of ASME B18.18.1M shall apply. If a nondesignated dimension is determined to be outside its specified limits, it shall be deemed conforming to this standard if the user who is the installer accepts the dimension, based on form, fit, and function considerations.

4.11 Designation

Slotted headless set screws shall be designated by the following data, preferably in the sequence shown: product name; nominal size (number, fraction, or deci-

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

mal equivalent); threads per inch; screw length; point style; material; protective finish, if required; or optionally, ASME B18.24 PIN code. See examples below:

EXAMPLES:

Slotted Headless Set Screw, $\frac{1}{4}$ – 20 × $\frac{1}{2}$, Cup Point, Steel, Zinc plated per ASTM B 633 Fe/Zn 5 type II, S620NB27CAD10155NNCE1.

Slotted Headless Set Screw, 190 – 32 × 0.38, Oval Point, Through Hardened Steel, S620NB32FAA08303NNAA1.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

APPENDIX I
THREAD RUNOUT SLEEVE GAGES FOR SLOTTED HEAD CAP SCREWS

(This Appendix is part of ASME B18.6.2-1998.)

Gages capable of checking the thread eccentricity and angularity respective to the axis of slotted head cap screws are illustrated on the following page.

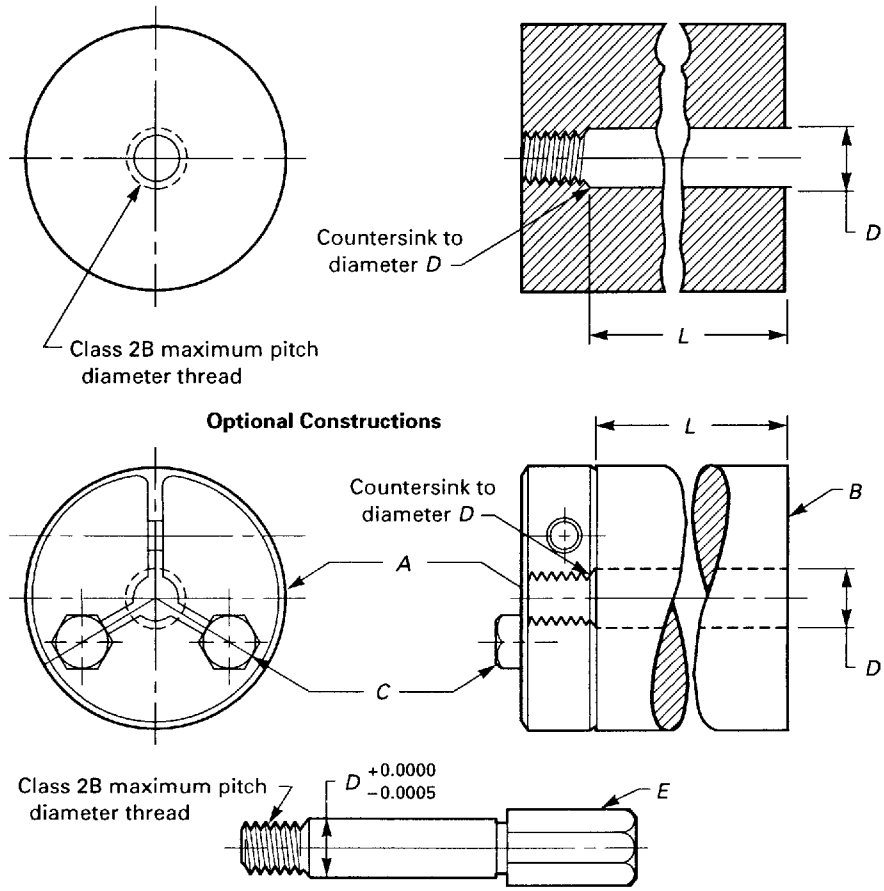
The lower construction permits the use of various length sleeves to accommodate different screw lengths. Thread ring gage *A* is centered on sleeve *B* by means of positioning plug *E* and is secured in position by means of attachment screws *C*. The ring gage is also set to Class 2B maximum pitch diameter by use of positioning plug *E*.

Diameter *D*, of counterbore or hole in sleeve, shall be equal to the basic (nominal) diameter of the screw plus the specified runout allowance. The sleeve length or counterbore depth *L* should be such that the entering face of the gage extends beyond the last thread on the screw to be inspected but for practical purposes should not exceed 3.00 in.

Failure of the screw to enter the threads of the gage for at least two threads or interference between the sides of the hole or counterbore and the screw while engaging the threads of gage indicates excessive thread runout.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale



GENERAL NOTES:

(a) To ensure adequate service life, gages shall be suitably hardened.

(b) Nomenclature is as follows:

A = thread ring gage set to Class 2B maximum pitch diameter
B = sleeve
C = attachment screws
D = basic diameter of screw plus diametral clearance allowance
E = positioning and setting plug for adjusting ring gage to Class 2B maximum pitch diameter and centering sleeve
L = depth of counterbore or length of sleeve equals length of screw minus twice the basic diameter of the screw but for practical purposes should not exceed 3.00 in.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

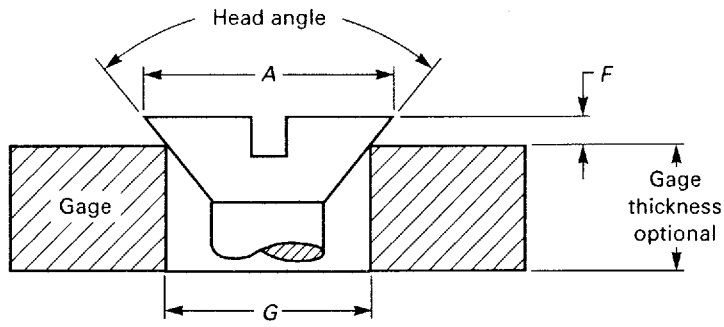
APPENDIX II
PROTRUSION GAGING OF FLAT COUNTERSUNK HEAD CAP SCREWS

(This Appendix is part of ASME B18.6.2-1998.)

Suitability of slotted flat countersunk head cap screws for application in countersinks designed to the principal dimensions of the screws may be tested by use of a protrusion gage as illustrated on the following page.

The gaging dimensions and the gage diameters are specified in the dimensional table for flat countersunk head cap screws. The protrusion limits shown in the table shall apply only when the gaging diameter is exactly as indicated with the gaging edge of a sharpness obtained by lapping the hole and the top surface of the gage. Any variation in the gaging diameter will require recalculation of protrusion values by the original formulas given on the following page.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS Not for Resale



Maximum Protrusion [Note (1)]:

$$\text{Max. } F = \frac{\text{Max. Sharp Head Diameter} - \text{Gage Hole Diameter}}{2} \times \tan\left(90° - \frac{\text{Min. Head Angle}}{2}\right)$$

Minimum Protrusion [Note (1)]:

$$\text{Min. } F = \frac{\text{Min. Sharp Head Diameter [Note (2)]} - \text{Gage Hole Diameter}}{2} \times \tan\left(90° - \frac{\text{Max. Head Angle}}{2}\right)$$

or correction of protrusion in accordance with the following formula:

$$F' = F\frac{A - G'}{A - G}$$

Where: F = tabulated protrusion value
F' = corrected protrusion value
A = head diameter (maximum or minimum for maximum or minimum protrusion, respectively)
G = tabulated gage diameter
G' = measured gage diameter

GENERAL NOTE: To ensure adequate service life, the protrusion gage should be made of tool steel having a hardness not less than 60 Rockwell C.

NOTES:

(1) Protrusion values shown in dimensional tables were calculated from these formulas and rounded to the nearest 0.001 in., upward for the maximum, and downward for the minimum.

(2) See formulas for minimum sharp head diameter in Appendix A.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS

Not for Resale

APPENDIX A
FORMULAS FOR DIMENSIONS

(This Appendix is not part of ASME B18.6.2-1998 and is provided for informational purposes only.)

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

TABLE A.1 SLOTTED FLAT COUNTERSUNK HEAD CAP SCREWS

Screw Size	Head Diameter	Head Height	Slot Depth
1/4 through 3/8	Max. A = 2.000 D to sharp corner Min. A = 1.840 D - 0.008 with round or flat Gaging diam. G = 1.810 D - 0.028 Min. A = 1.940 D - 0.008 to sharp corner [Note (1)]	Max. H = 0.596 D Min. H = 0.541 D - 0.005 [Note (1)]	Max. T = 0.274 D Min. T = 0.188 D - 0.002
7/16	Max. A = 2.000 D - 0.063 to sharp corner Min. A = 1.840 D - 0.069 with round or flat Gaging diam. G = 1.810 D - 0.089 Min. A = 1.940 D - 0.069 to sharp corner [Note (1)]	Max. H = 0.596 D - 0.0375 Min. H = 0.541 D - 0.040 [Note (1)]	Max. T = 0.274 D - 0.017 Min. T = 0.188 D - 0.014
1/2 through 1	Max. A = 2.000 D - 0.125 to sharp corner Min. A = 1.840 D - 0.129 with round or flat Gaging diam. G = 1.810 D - 0.149 Min. A = 1.940 D - 0.129 to sharp corner [Note (1)]	Max. H = 0.596 D - 0.075 Min. H = 0.541 D - 0.074 [Note (1)]	Max. T = 0.274 D - 0.034 Min. T = 0.188 D - 0.026
1 1/8 through 1 1/2	Max. A = 2.000 D - 0.188 to sharp corner Min. A = 1.840 D - 0.190 with round or flat Gaging diam. G = 1.810 D - 0.210 Min. A = 1.940 D - 0.190 to sharp corner [Note (1)]	Max. H = 0.596 D - 0.112 Min. H = 0.541 D - 0.109 [Note (1)]	Max. T = 0.274 D - 0.051 Min. T = 0.188 D - 0.038

GENERAL NOTE: D = basic diameter of the screw

NOTE:
(1) Values are no longer tabulated; formulas are retained here for reference only.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

TABLE A.2 SLOTTED ROUND HEAD CAP SCREWS

Screw Size	Head Diameter	Head Height	Slot Depth
1/4 and 5/16	Max. A = 2.000 D - 0.063 Min. A = 1.960 D - 0.072	Max. H = 0.875 D - 0.028 Min. H = 0.815 D - 0.029	Max. T = 0.543 D - 0.019 Min. T = 0.463 D - 0.019
3/8 and 7/16	Max. A = 2.000 D - 0.125 Min. A = 1.960 D - 0.132	Max. H = 0.875 D - 0.055 Min. H = 0.815 D - 0.054	Max. T = 0.543 D - 0.036 Min. T = 0.463 D - 0.036
1/2 and 9/16	Max. A = 2.000 D - 0.1875 Min. A = 1.960 D - 0.1935	Max. H = 0.875 D - 0.083 Min. H = 0.815 D - 0.080	Max. T = 0.543 D - 0.053 Min. T = 0.463 D - 0.053
5/8 and 3/4	Max. A = 2.000 D - 0.250 Min. A = 1.960 D - 0.255	Max. H = 0.875 D - 0.110 Min. H = 0.815 D - 0.104	Max. T = 0.543 D - 0.069 Min. T = 0.463 D - 0.069

GENERAL NOTE: D = basic diameter of the screw

TABLE A.3 SLOTTED FILLISTER HEAD CAP SCREWS

Screw Size	Head Diameter	Head Side Height	Oval Height
1/4 and 5/16	Max. A = 1.000 D + 0.125 Min. A = 0.980 D + 0.118	Max. H = 0.660 D to nearest 1/64 in. Min. H = Max. H - (0.030 D + 0.008)	Max. F = 0.110 D + 0.016 Min. F = 0.100 D + 0.0125
3/8 and 7/16	Max. A = 1.000 D + 0.1875 Min. A = 0.980 D + 0.180	Max. H = 0.660 D to nearest 1/64 in. Min. H = Max. H - (0.030 D + 0.010)	Max. F = 0.110 D + 0.023 Min. F = 0.100 D + 0.018
1/2 through 7/8	Max. A = 1.000 D + 0.250 Min. A = 0.980 D + 0.241	Max. H = 0.660 D to nearest 1/64 in. Min. H = Max. H - (0.030 D + 0.012)	Max. F = 0.110 D + 0.030 Min. F = 0.100 D + 0.025
1	Max. A = 1.000 D + 0.3125 Min. A = 0.980 D + 0.302	Max. H = 0.660 D to nearest 1/64 in. Min. H = Max. H - (0.030 D + 0.014)	Max. F = 0.110 D + 0.037 Min. F = 0.100 D + 0.031

Screw Size	Total Head Height	Slot Depth
1/4 through 1	Max. O = Max. F + Max. H Min. O = Min. F + Min. H	Max. T = 0.500 (Min. F + Min. H) Min. T = Max. T - 0.080 D

GENERAL NOTE: D = basic diameter of the screw

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

TABLE A.4 WIDTH OF SLOT IN SLOTTED HEAD CAP SCREWS

Screw Size	Basic Width	Tolerance		
		Screw Size	Plus	Minus
1/4 through 1	Basic slot width = 0.160 D + 0.024 adjusted to standard cutter size	1/4	0.005	0.006
		5/16	0.005	0.007
		3/8 and 7/16	0.005	0.008
1 1/8 through 1 1/2	Basic slot width = 0.160 D adjusted to standard cutter size	1/2 through 5/8	0.006	0.009
		3/4 through 1	0.007	0.009
		1 1/8 through 1 1/2	0.008	0.010

GENERAL NOTE: D = basic diameter of the screw

TABLE A.5 SQUARE HEAD SET SCREWS

Screw Size	Width Across Flats		Head Height		Width Across Corners
	Basic	Tolerance (Minus)	Basic	Tolerance (Plus and Minus)	
10 through 5/16	F = 1.000 D	No formula, see table	H = 0.750 D	0.020 D + 0.004	Max. G = 1.4142 (Max. F) Min. G = 1.373 (Min. F)
3/8 through 1 1/2	F = 1.000 D	0.020 D + 0.006	H = 0.750 D	0.020 D + 0.004	Max. G = 1.4142 (Max. F) Min. G = 1.373 (Min. F)

GENERAL NOTE: D = basic diameter of the screw

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

APPENDIX B
WRENCH OPENINGS FOR SQUARE HEAD SET SCREWS

(This Appendix is not part of ASME B18.6.2-1998 and is provided for informational purposes only.)

TABLE B.1 WRENCH OPENINGS FOR SQUARE HEAD SET SCREWS

Nominal Size of Wrench [Note (1)]; Also Basic (Maximum) Width Across Flats of Screw Head		Allowance Between Head Flats and Jaws of Wrench [Note (2)]	Wrench Openings			Nominal Screw Size
			Min.	Tolerance [Note (2)]	Max.	
3/16	0.1875	0.002	0.190	0.005	0.195	10
1/4	0.2500	0.002	0.252	0.005	0.257	1/4
5/16	0.3125	0.003	0.316	0.006	0.322	5/16
3/8	0.3750	0.003	0.378	0.006	0.384	3/8
7/16	0.4375	0.003	0.440	0.006	0.446	7/16
1/2	0.5000	0.004	0.504	0.006	0.510	1/2
9/16	0.5625	0.004	0.566	0.007	0.573	9/16
5/8	0.6250	0.004	0.629	0.007	0.636	5/8
3/4	0.7500	0.005	0.755	0.008	0.763	3/4
7/8	0.8750	0.005	0.880	0.008	0.888	7/8
1	1.0000	0.006	1.006	0.009	1.015	1
1 1/8	1.1250	0.007	1.132	0.010	1.142	1 1/8
1 1/4	1.2500	0.007	1.257	0.010	1.267	1 1/4
1 3/8	1.3750	0.008	1.383	0.011	1.394	1 3/8
1 1/2	1.5000	0.008	1.508	0.012	1.520	1 1/2

NOTES:

(1) Wrenches shall be marked with the nominal size of the wrench, which is equal to the basic (maximum) width across flats of the corresponding screw head.

(2) The allowance (minimum clearance) between the maximum width across flats of the screw head and jaws of the wrench equals $0.006\ W + 0.001$. The tolerance on wrench opening equals $0.005\ W + 0.004$ from the minimum, where W equals the nominal size of wrench.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale

ASME Services

ASME is committed to developing and delivering technical information. At ASME's Information Central, we make every effort to answer your questions and expedite your orders. Our representatives are ready to assist you in the following areas:

ASME Press
Codes & Standards
Credit Card Orders
IMechE Publications
Meetings & Conferences
Member Dues Status
Member Services & Benefits
Other ASME Programs
Payment Inquiries
Professional Development
Short Courses
Publications
Public Information
Self-Study Courses
Shipping Information
Subscriptions/Journals/Magazines
Symposia Volumes
Technical Papers

How can you reach us? It's easier than ever!

There are four options for making inquiries* or placing orders. Simply mail, phone, fax, or E-mail us and an Information Central representative will handle your request.

Mail
ASME
22 Law Drive, Box 2900
Fairfield, New Jersey
07007-2900

Call Toll Free
US & Canada: 800-THE-ASME
(800-843-2763)
Mexico: 95-800-THE-ASME
(95-800-843-2763)
Universal: 973-882-1167

Fax-24 hours
973-882-1717
973-882-5155

E-Mail-24 hours
Infocentral
@asme.org

* Information Central staff are not permitted to answer inquiries about the technical content of this code or standard. Information as to whether or not technical inquiries are issued to this code or standard is shown on the copyright page. All technical inquiries must be submitted in writing to the staff secretary. Additional procedures for inquiries may be listed within.

Copyright ASME International
Provided by IHS under license with ASME
No reproduction or networking permitted without license from IHS
Not for Resale