

ASME B18.6.2-2020

[Revision of ASME B18.6.2-1998 (R2010)]

Square Head Set Screws and Slotted Headless Set Screws (Inch Series)

AN AMERICAN NATIONAL STANDARD



**The American Society of
Mechanical Engineers**

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

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ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the Committee web page and under <http://go.asme.org/InterpsDatabase>. Periodically certain actions of the ASME B18 Committee may be published as Cases. Cases are published on the ASME website under the B18 Committee Page at <http://go.asme.org/B18committee> as they are issued.

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FOREWORD

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 3² was subsequently established and charged with the responsibility for technical content of standards covering slotted and recessed head screws.

In 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 3² was reorganized and expanded, and the following operating scope was established.

The scope of Subcommittee 3² 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 3² 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 respective documents.

ASME B18 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)

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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 or a case, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B18 Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
<http://go.asme.org/Inquiry>

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

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

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

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

Interpretations. Upon request, the B18 Standards Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B18 Standards Committee.

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

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the B18 Standards Committee at the above address. The request for an interpretation should be clear and unambiguous. It is further recommended that the Inquirer submit his/her request in the following format:

Subject: Cite the applicable paragraph number(s) and the topic of the inquiry in one or two words.
Edition: Cite the applicable edition of the Standard for which the interpretation is being requested.
Question: Phrase the question as a request for an interpretation of a specific requirement suitable for

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

1 INTRODUCTION

1.1 Scope

This Standard covers the complete general and dimensional data for square head and slotted headless set screws. Also included is [Nonmandatory Appendix A](#) covering the formulas on which dimensional data are based, and [Nonmandatory Appendix B](#) covering wrench openings for square head set screws. Where questions arise concerning acceptance of a product, the dimensions in the tables shall supersede those recalculated by formula.

1.2 Comparison to ISO Standards

There is no comparable ISO standard for the fasteners specified by this Standard.

1.3 Dimensions

Unless otherwise specified, all dimensions are in inches and shall apply before coating.

1.4 Options

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

1.5 Terminology

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

slotted headless set screw: screw with 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.

square head set screw: screw with 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.

1.6 References

The following is a list of publications referenced in this Standard. Unless otherwise specified, the latest edition shall be used.

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

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

ASME B18.12, Glossary of Terms for Mechanical Fasteners

ASME B18.18, Quality Assurance for Fasteners

ASME B18.24, Part Identifying Number (PIN) Code System Standard for B18 Fastener Products

Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

ASTM A380/A380M, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems

ASTM F1941/F1941M, Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric

Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 (www.astm.org)

1.7 Part Identifying Number

For a Part Identifying Number, refer to ASME B18.24.

2 GENERAL DATA FOR SQUARE HEAD SET SCREWS

2.1 Heads

2.1.1 Head Height. The head height 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.

2.1.2 Width Across Flats. The maximum width across flats shall not be exceeded. However, on milled-from-bar, nonferrous screws, the maximum limit may conform to commercial tolerances of the bar stock material. No

Table 2.2.2-1 Length Tolerances: Square Head Set Screws

Nominal Screw Length, in.	Nominal Screw Size or Basic Screw Diameter	
	10 (0.190) Through $\frac{5}{8}$ (0.625)	$\frac{3}{4}$ (0.750) Through $1\frac{1}{2}$ (1.500)
	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

transverse section through the head height shall be less than the specified minimum width across flats.

2.1.3 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. For referee purposes, the evaluation shall be made by holding the body in a collet or chuck one bolt diameter from under the head and rotating the part. With the indicator in line with the axis of the bolt or screw, find and record the lowest point on each flat or the highest point on each lobe. The true position is one-half of the largest absolute difference between the high and low values for any opposing set of flats or lobes.

2.2 Length

2.2.1 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.

2.2.2 Length Tolerance. The length tolerance for square head set screws shall be as shown in Table 2.2.2-1.

2.3 Threads

2.3.1 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 NO GO.

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

2.4 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 the head, or 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.

2.5 Points

2.5.1 Point Types. When unspecified, square head set screws shall be supplied with cup points. Cup points may be knurled (internally or externally) at the manufacturer's option. Specifications for cone, dog, half-dog, flat, and oval points are in Table 2.5.1-1.

2.5.2 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.

2.5.3 Dog Points. When the length of usable (effective) thread is less than the basic screw diameter, dog points shall not be used. Half-dog points shall be used for such screw lengths.

2.5.3.1 Point True Position. The axis of the dog or 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 $\frac{3}{4}$ (0.750) in. and a diameter of 0.020 in. for larger sizes, regardless of feature size.

2.6 Material

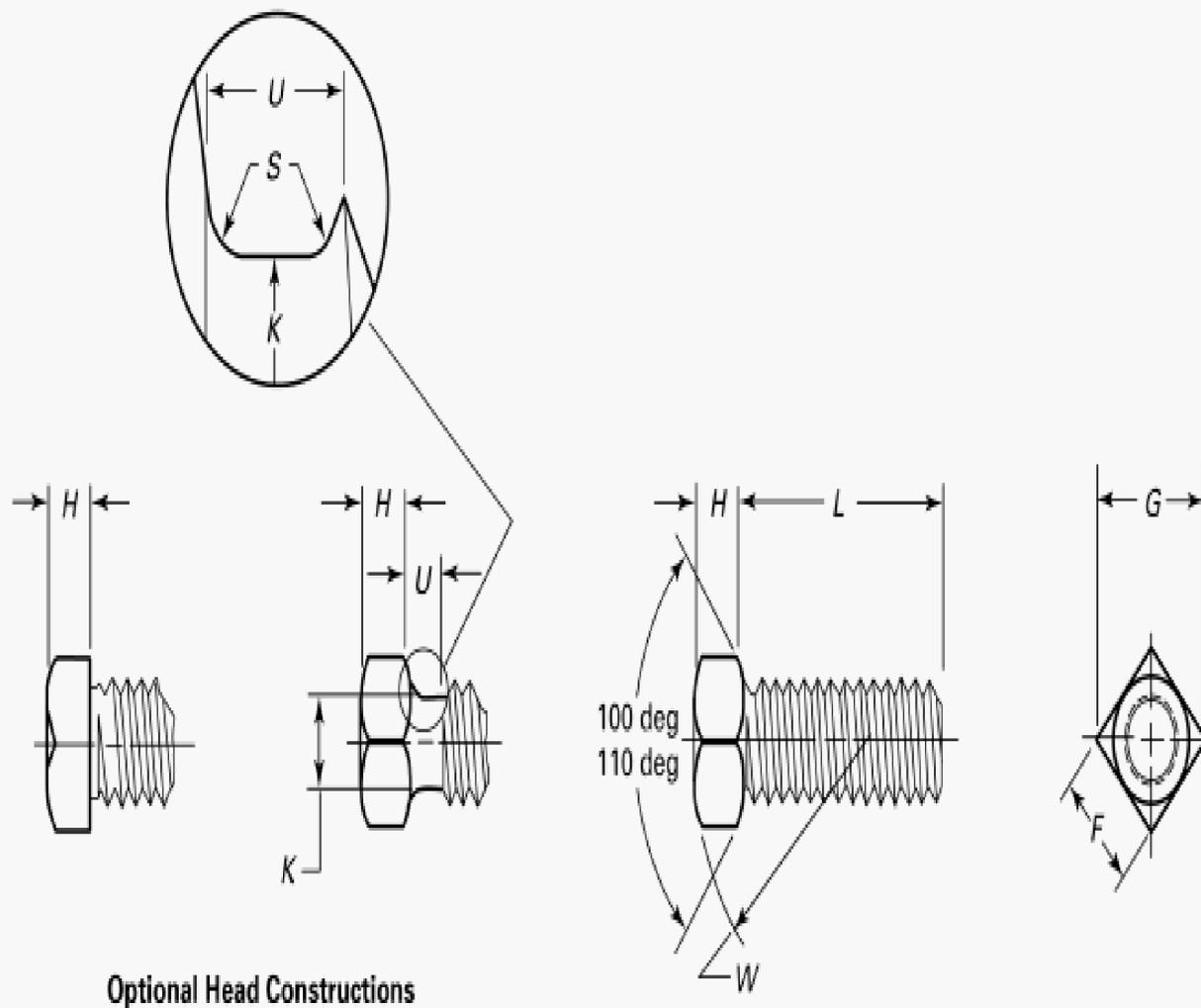
When a material is not specified, square head set screws shall be made from case-hardened steel or through-hardened steel at the option of the manufacturer.

2.6.1 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:

	Nominal Size or Basic Screw Diameter, in.	Case Depth
No. 10	0.190	0.004-0.009
$\frac{1}{4}$ - $1\frac{1}{2}$	0.250-1.500	0.006 min.

2.6.2 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 HRC to 53 HRC (450 HV to 560 HV or 428 HB to 532 HB), with a surface hardness at least equal to the core hardness but not exceeding 88 HR15N.

Table 2.5.1-1 Dimensions of Square Head Set Screws



Optional Head Constructions

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Nominal Size [Note (1)] or Basic Screw Diameter	Width Across Flats, <i>F</i>		Width Across Corners, <i>G</i>		Head Height, <i>H</i>		Neck Relief Diameter, <i>K</i>		Maximum Neck Relief Fillet Radius, <i>S</i>	Minimum Neck Relief Width, <i>U</i>	Minimum Head Radius, <i>W</i>	Cup and Flat Point Diameters, <i>C</i>		Dog and Half- Dog Point Diameters, <i>P</i>		Point Length				Oval Point Radius, <i>R</i>	Cone Point Angle: 90 deg ±2 deg for These Nominal Lengths or Longer; 118 deg ±2 deg for Shorter Screws, <i>Y</i> [Note (2)]	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.				Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.			Max.
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	0.102	0.088	0.127	0.120	0.095	0.085	0.050	0.040	0.142	1/4
1/4	0.2500	0.250	0.241	0.354	0.331	0.196	0.178	0.185	0.170	0.032	0.100	0.62	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	0.302	0.442	0.415	0.245	0.224	0.240	0.225	0.036	0.111	0.78	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	0.362	0.530	0.497	0.293	0.270	0.294	0.279	0.041	0.125	0.94	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	0.423	0.619	0.581	0.341	0.315	0.345	0.330	0.046	0.143	1.09	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	0.484	0.707	0.665	0.389	0.361	0.400	0.385	0.050	0.154	1.25	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	0.545	0.795	0.748	0.437	0.407	0.454	0.439	0.054	0.167	1.41	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	0.606	0.884	0.833	0.485	0.452	0.507	0.492	0.059	0.182	1.56	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	0.729	1.060	1.001	0.582	0.544	0.620	0.605	0.065	0.200	1.88	0.450	0.425	0.562	0.549	0.383	0.367	0.196	0.180	0.562	7/8
7/8	0.8750	0.875	0.852	1.237	1.170	0.678	0.635	0.731	0.716	0.072	0.222	2.19	0.530	0.502	0.656	0.642	0.446	0.430	0.227	0.211	0.656	1
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	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	1.125	1.096	1.591	1.505	0.870	0.817	0.939	0.914	0.092	0.283	2.81	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	1.250	1.219	1.768	1.674	0.966	0.908	1.064	1.039	0.092	0.283	3.12	0.767	0.733	0.938	0.920	0.635	0.615	0.323	0.303	0.938	1 1/2

Table 2.5.1-1 Dimensions of Square Head Set Screws (Cont'd)

Nominal Size [Note (1)] or Basic Screw Diameter	Width Across Flats, <i>F</i>		Width Across Corners, <i>G</i>		Head Height, <i>H</i>		Neck Relief Diameter, <i>K</i>		Maximum Neck Relief Fillet Radius, <i>S</i>	Minimum Neck Relief Width, <i>U</i>	Minimum Head Radius, <i>W</i>	Cup and Flat Point Diameters, <i>C</i>		Dog and Half- Dog Point Diameters, <i>P</i>		Point Length				Oval Point Radius, <i>R</i>	Cone Point Angle: 90 deg ±2 deg for These Nominal Lengths or Longer; 118 deg ±2 deg for Shorter Screws, <i>Y</i> [Note (2)]	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.				Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.			Max.
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	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	1.500	1.464	2.121	2.010	1.159	1.091	1.284	1.759	0.109	0.333	3.75	0.926	0.886	1.125	1.105	0.760	0.740	0.385	0.365	1.125	1 ³ / ₄

GENERAL NOTES:

- (a) For additional requirements, refer to [section 2](#).
- (b) Point angle *X* shall be 45 deg +5 deg, -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.

NOTES:

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

2.6.3 Other Materials. When 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.

2.7 Finishes

Unless otherwise specified, bolts and screws shall be supplied with a plain (as-processed) finish, unplated or uncoated. Light oil on the surface is permissible to avoid corrosion during transportation, packaging, and further handling. If square head set screws are electroplated, they shall be suitably treated to minimize hydrogen embrittlement.

2.8 Workmanship

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

2.9 Quality Assurance

Manufacturers shall provide screws in accordance with ASME B18.18, Category 2.

2.10 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.

EXAMPLES:

- (1) Square Head Set Screw, ASME B18.6.2, $\frac{1}{4}$ — 20 × $\frac{3}{4}$, Flat Point, Case-Hardened Steel, Zinc plated per ASTM F1941/F1941M Fe/Zn 5C
- (2) Square Head Set Screw, ASME B18.6.2, 0.250 — 20 × 0.75, Cup Point, Through Hardened Steel, Zinc plated per ASTM F1941/F1941M Fe/Zn 3AN
- (3) Square Head Set Screw, ASME B18.6.2, 0.500 — 13 × 1.25, Cone Point, 303 Corrosion Resistant Steel, Hardness 70 – 95 HRB, Passivated per ASTM A380/A380M

3 GENERAL DATA FOR SLOTTED HEADLESS SET SCREWS

3.1 Headless Ends

3.1.1 End Configuration. The slotted end of screws may be crowned as shown and dimensioned in [Table 3.1.1-1](#) or may be flat, at the option of the manufacturer.

3.1.2 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.

3.1.3 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 0.020 in., whichever is greater, regardless of feature size.

3.2 Length

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

3.2.2 Length Tolerance. The length tolerance for slotted headless set screws shall be as shown in [Table 3.2.2-1](#).

3.3 Threads

3.3.1 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 NO GO.

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

3.4 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.

3.5 Points

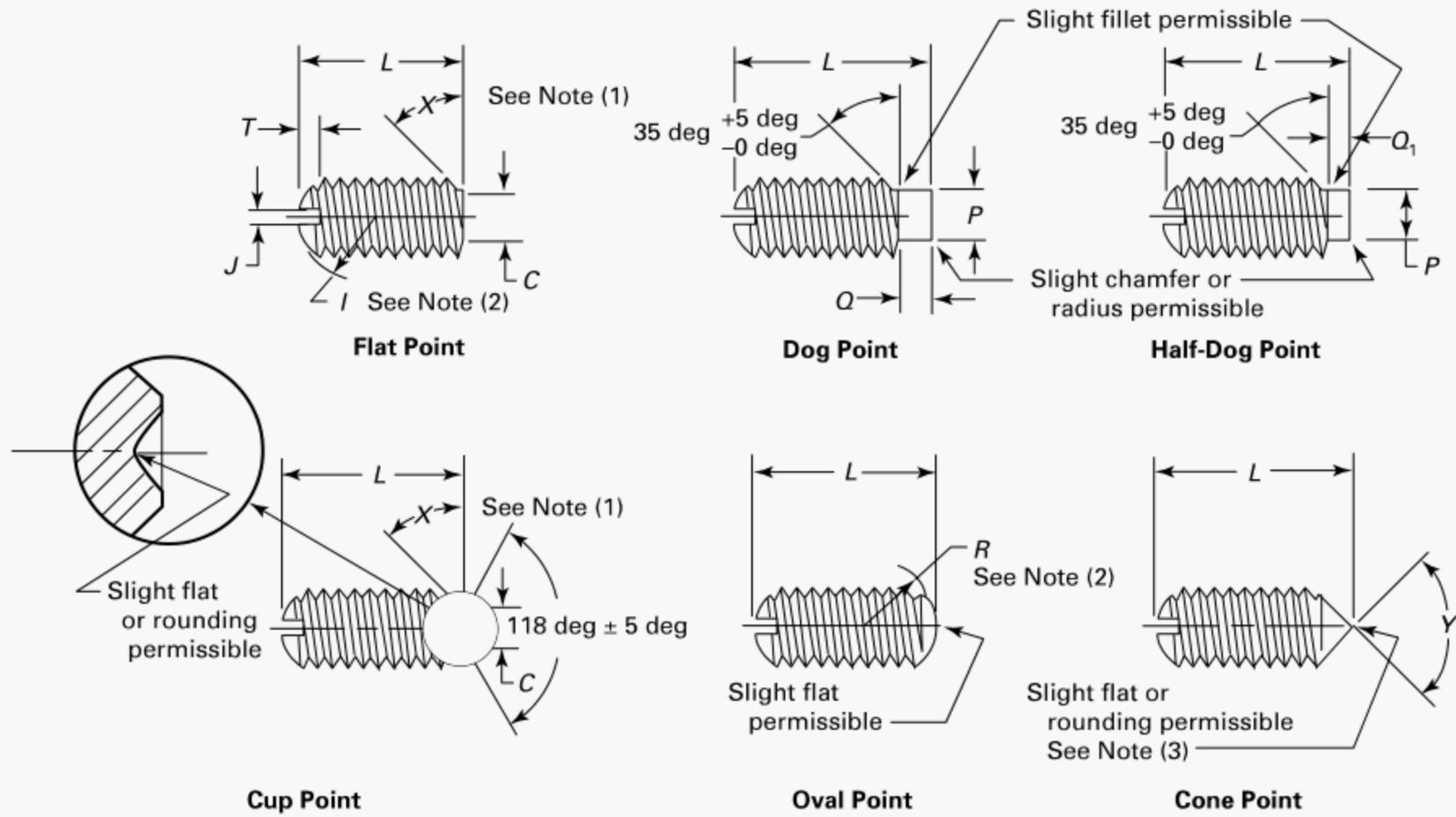
3.5.1 Point Types. Unless otherwise specified, slotted headless set screws shall be supplied with cup points. When specified by the purchaser, screws shall have cone, dog, half-dog, flat, or oval points conforming to specifications in [Table 3.1.1-1](#).

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 or half-dog points shall be located at true position with respect to the axis of the thread within a tolerance

Table 3.1.1-1 Dimensions of Slotted Headless Set Screws



Nominal Size [Note (4)] or Basic Screw Diameter	Basic Crown Radius <i>I</i> [Note (2)]	Slot Width, <i>J</i>		Slot Depth, <i>T</i>		Cup and Flat Point Diameters, <i>C</i>		Dog Point Diameters, <i>P</i>		Point Length				Basic Oval Point Radius, <i>R</i> [Note (2)]	Cone Point Angle: 90 deg ± 2 deg for These Nominal Lengths or Longer; 118 deg ± 2 deg for Shorter Screws, <i>Y</i>	
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.			
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 NOTE: For additional requirements, refer to section 3.

NOTES:

- (1) Point angle *X* shall be 45 deg +5 deg, -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 +0.015 in., -0.000 and for larger sizes, +0.031 in., -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) When specifying nominal size in decimals, zeros preceding the decimal and in the fourth decimal place shall be omitted.

Table 3.2.2-1 Length Tolerances: Slotted Headless Set Screws

Nominal Screw Length, in.	Length Tolerance
Through 1 (1.00)	-0.03
Over 1 (1.00) through 2 (2.00)	-0.06
Over 2 (2.00)	-0.09

zone equal to 6% of the basic screw diameter or 0.010 in., whichever is less, regardless of feature size.

3.6 Material

When a material is not specified, slotted headless set screws shall be made from case-hardened steel or through-hardened steel at the option of the manufacturer.

3.6.1 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:

Nominal Size or Basic Screw Diameter, in.	Case Depth
No. 2-6	0.086-0.138
No. 8-12	0.164-0.216
$\frac{1}{4}$ - $\frac{3}{4}$	0.250-0.750
	0.006 min.

3.6.2 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 HRC to 53 HRC (450 HV to 560 HV or 428 HB to 532 HB), with a surface hardness at least equal to the core hardness but not exceeding 88 HR15N.

3.6.3 Other Materials. When 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.

3.7 Finish

Unless otherwise specified, bolts and screws shall be supplied with a natural (as-processed) finish, unplated or uncoated. Light oil on the surface is permissible to avoid corrosion during transportation, packaging, and further handling. If slotted headless set screws are electroplated, they shall be suitably treated to minimize hydrogen embrittlement.

3.8 Workmanship

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

3.9 Quality Assurance

Manufacturers shall provide screws in accordance with ASME B18.18, Category 2.

3.10 Designation

Slotted headless 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; point style; material; protective finish, if required; and optionally, ASME B18.24 PIN code. See examples below.

EXAMPLES:

- (1) Slotted headless set screw, ASME B18.6.2, $\frac{1}{4}$ — 20 × $\frac{1}{2}$, cup point, steel, zinc plated per ASTM F1941/F1941M Fe/Zn 3AN
- (2) Slotted headless set screw, ASME B18.6.2, 0.190 — 32 × 0.38, oval point, through-hardened steel, plain

NONMANDATORY APPENDIX A FORMULAS FOR DIMENSIONS

Table A-1 Square Head Set Screws

Screw Size	Width Across Flats, F		Head Height, H		Width Across Corners, G
	Basic	Tolerance (Minus)	Basic	Tolerance (Plus and Minus)	
10 through $\frac{5}{16}$	$F = 1.000D$	No formula, see Table 2.5.1-1	$H = 0.750D$	$0.020D + 0.004$	Max. $G = 1.4142$ (Max. F) Min. $G = 1.373$ (Min. F)
$\frac{3}{8}$ through $1\frac{1}{2}$	$F = 1.000D$	$0.020D + 0.006$	$H = 0.750D$	$0.020D + 0.004$	Max. $G = 1.4142$ (Max. F) Min. $G = 1.373$ (Min. F)

GENERAL NOTE: D = basic diameter of the screw

NONMANDATORY APPENDIX B WRENCH OPENINGS FOR SQUARE HEAD SET SCREWS

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.	
$\frac{3}{16}$	0.1875	0.002	0.190	0.005	0.195	10
$\frac{1}{4}$	0.2500	0.002	0.252	0.005	0.257	$\frac{1}{4}$
$\frac{5}{16}$	0.3125	0.003	0.316	0.006	0.322	$\frac{5}{16}$
$\frac{3}{8}$	0.3750	0.003	0.378	0.006	0.384	$\frac{3}{8}$
$\frac{7}{16}$	0.4375	0.003	0.440	0.006	0.446	$\frac{7}{16}$
$\frac{1}{2}$	0.5000	0.004	0.504	0.006	0.510	$\frac{1}{2}$
$\frac{9}{16}$	0.5625	0.004	0.566	0.007	0.573	$\frac{9}{16}$
$\frac{5}{8}$	0.6250	0.004	0.629	0.007	0.636	$\frac{5}{8}$
$\frac{3}{4}$	0.7500	0.005	0.755	0.008	0.763	$\frac{3}{4}$
$\frac{7}{8}$	0.8750	0.005	0.880	0.008	0.888	$\frac{7}{8}$
1	1.0000	0.006	1.006	0.009	1.015	1
$1\frac{1}{8}$	1.1250	0.007	1.132	0.010	1.142	$1\frac{1}{8}$
$1\frac{1}{4}$	1.2500	0.007	1.257	0.010	1.267	$1\frac{1}{4}$
$1\frac{3}{8}$	1.3750	0.008	1.383	0.011	1.394	$1\frac{3}{8}$
$1\frac{1}{2}$	1.5000	0.008	1.508	0.012	1.520	$1\frac{1}{2}$

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 $0.006W + 0.001$. The tolerance on wrench opening equals $0.005W + 0.004$ from the minimum, where W equals the nominal size of wrench.

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B18 AMERICAN NATIONAL STANDARDS FOR BOLTS, NUTS, RIVETS, SCREWS, WASHERS, AND SIMILAR FASTENERS

B18.1.1-1972 (R2016)	Small Solid Rivets
B18.1.2-1972 (R2016)	Large Rivets
B18.1.3M-1983 (R2016)	Metric Small Solid Rivets
B18.2.1-2012	Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)
B18.2.2-2015	Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
B18.2.3.5M-1979 (R2016)	Metric Hex Bolts
B18.2.3.9M-2001 (R2020)	Metric Heavy Hex Flange Screws
B18.2.4.3M-1979 (R2017)	Metric Slotted Hex Nuts
B18.2.5M-2013 (R2017)	Metric 12-Point Flanged Head Screws
B18.2.6-2019	Fasteners for Use in Structural Applications
B18.2.6M-2012	Metric Fasteners for Use in Structural Applications
B18.2.8-1999 (R2017)	Clearance Holes for Bolt, Screws, and Studs
B18.2.9-2010 (R2017)	Straightness Gage and Gaging for Bolts and Screws
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B18.10-2006 (R2016)	Track Bolts and Nuts
B18.11-1961 (R2017)	Miniature Screws
B18.12-2020	Glossary of Terms for Mechanical Fasteners
B18.13-2017	Screw and Washer Assemblies — SEMS (Inch Series)
B18.13.1M-2011 (R2016)	Screw and Washer Assemblies: SEMS (Metric Series)
B18.15-2015	Forged Eyebolts
B18.16M-2004 (R2016)	Prevailing-Torque Type Steel Metric Hex Nuts and Hex Flange Nuts
B18.16.4-2008 (R2017)	Serrated Hex Flange Locknuts 90,000 psi (Inch Series)
B18.16.6-2017	Prevailing Torque Locknuts (Inch Series)
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B18.21.3-2008 (R2017)	Double Coil Helical Spring Lock Washers for Wood Structures
B18.22M-1981 (R2017)	Metric Plain Washers
B18.24-2020	Part Identifying Number (PIN) Code System for B18 Fastener Products
B18.27-1998 (R2017)	Tapered and Reduced Cross Section Retaining Rings (Inch Series)
B18.29.1-2010 (R2017)	Helical Coil Screw Thread Inserts — Free Running and Screw Locking (Inch Series)
B18.29.2M-2005 (R2017)	Helical Coil Screw Thread Inserts: Free Running and Screw Locking (Metric Series)
B18.31.1M-2008 (R2016)	Metric Continuous and Double-End Studs

B18.31.2-2014 (R2019)	Continuous Thread Stud, Double-End Stud, and Flange Bolting Stud (Stud Bolt) (Inch Series)
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