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ASME B18.5-1990

(REVISION OF ANSI B18.5-1978)

Round Head Bolts (Inch Series)

AN AMERICAN NATIONAL STANDARD



The American Society of Mechanical Engineers

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345 East 47th Street, New York, N.Y. 10017

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FOREWORD

(This Foreword is not part of ASME B18.5-1990.)

American National Standards Committee B18 for the standardization of bolts, screws, nuts, rivets, and similar fasteners was originated in March 1922 as Sectional Committee B18, under the aegis of the American Engineering Standards Committee [later the American Standards Association, the United States of America Standards Institute, and as of October 6, 1969, the American National Standards Institute, Inc. (ANSI)], with the Society of Automotive Engineers and the American Society of Mechanical Engineers as joint sponsors. Subcommittee 5 was subsequently established and charged with the responsibility for technical content of standards covering round unslotted head bolts.

The initial proposal completed by the Subcommittee in February of 1923 consisted of standards covering head dimensions for carriage, step, and round head machine bolts. Circulation of the original draft and numerous revisions thereto culminated in a document which was issued as a Tentative American Standard on February 20, 1928.

In 1934, Subcommittee 5 initiated work on a revision of the standard to bring it into line with altered consumer requirements and refinements in manufacturing technology. A proposal containing dimensional changes and additional data was duly approved and issued as a revision in 1939.

Early in 1947, Subcommittee 5 commenced to conduct an extensive review of the existing document and to expand it into a complete product standard. Over the ensuing three years, the Subcommittee developed a proposal incorporating the adoption of a shorter depth of square neck and the addition of coverage for commonly used elevator bolts and T-head bolts plus a round head short square neck bolt used extensively by the farm equipment industry in thin metals. Subsequent to acceptance by the Subcommittee, the B18 Committee and sponsor organizations, the proposal was submitted to the American Standards Association for approval and designation as an American National Standard. This was granted on March 12, 1952.

In 1966, the Subcommittee, recognizing the need for updating the standard, undertook development of a revision. Numerous meetings and work sessions resulted in Subcommittee acceptance of a draft incorporating changes to clarify intent and overcome inconsistencies in specifications and format with related documents. Included were the redimensioning of countersunk type heads, the adaption of new tolerances on bolt length, the addition of straightness requirements, and the elimination of coverage for ribbed head type elevator bolts. Following letter ballot approval by the B18 Standards Committee and the sponsor organizations, the revision was submitted to the American National Standards Institute and was designated an American National Standard on January 20, 1971.

In 1977, the Subcommittee again recognized the need for a revision. Following letter ballot approval by the B18 Standards Committee, the revision was approved by the Secretariat and ANSI on September 8, 1978.

The B18 Committee began a revision in 1984 to upgrade the standard to include information on identification symbols and to add quality assurance provisions.

In December 1986, the ASME B18 Committee agreed to combine Subcommittee 5

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into Subcommittee 2, since the product lines each Subcommittee addresses are quite similar.

The B18 Committee further agreed the designation of the Subcommittee 2 and 5 documents not be changed, since this would adversely affect current reference to these Standards.

Following approval by the B18 Committee, the proposal was submitted to the American National Standards Institute for approval. ANSI approval was received on December 27, 1990.

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ASME Standards Committee B18
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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ROUND HEAD BOLTS (INCH SERIES)

1 INTRODUCTORY NOTES

1.1 Scope

1.1.1 This Standard covers the complete general and dimensional data for the various types of inch series bolts generally classified as round head bolts and recognized as American National Standard. Also included is an Appendix covering gages and gaging for checking bolt straightness.

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

1.2 Bolt Types

The bolt types covered by this Standard are enumerated and described below.

1.2.1 Round Head Bolt (Formerly Designated Button Head Bolt). The round head bolt shall have a circular head with a low rounded top surface and a flat bearing surface. Dimensions are given in Table 1.

1.2.2 Round Head Square Neck Bolt (Formerly Designated Round Head Carriage Bolt). The round head square neck bolt shall have a circular head with a low rounded top surface and flat bearing surface, and an integrally formed square neck under the head. Dimensions are given in Table 2.

1.2.3 Round Head Short Square Neck Bolt. The round head short square neck bolt shall have a circular head with a low rounded top surface and flat bearing surface, and an integrally formed short length square neck under the head. Dimensions are given in Table 3.

1.2.4 Round Head Ribbed Neck Bolt (Formerly Designated Ribbed Neck Carriage Bolt). The round head ribbed neck bolt shall have a circular head with a low rounded top surface and flat bearing surface, and a ribbed or splined neck formed on the shank below the head. Dimensions are given in Table 4.

1.2.5 Round Head Fin Neck Bolt (Formerly Designated Fin Neck Carriage Bolt). The round head fin neck bolt shall have a circular head with a low rounded top surface and flat bearing surface, and two diametrically opposite integrally formed fins at the junction of head with shank. Dimensions are given in Table 5.

1.2.6 Step Bolt. The step bolt shall have a large circular head with a low rounded top surface and flat bearing surface, and an integrally formed square neck under the head. Dimensions are given in Table 6.

1.2.7 Countersunk Bolt. The countersunk bolt shall have a circular head with a flat top surface and a conical bearing surface having a head angle of approximately 80 deg. Countersunk bolts are available with and without a slot in the head, as specified by the purchaser. Dimensions are given in Table 7.

1.2.8 114 Deg. Countersunk Square Neck Bolt (Formerly Designated Countersunk Carriage Bolt). The 114 deg. countersunk square neck bolt shall have a circular head with a flat top surface and a conical bearing surface having a head angle of approximately 114 deg., and an integrally formed square neck under the head. Dimensions are given in Table 8.

1.2.9 Flat Countersunk Head Elevator Bolt. The flat countersunk head elevator bolt shall have a large circular head with a flat top surface and a shallow conical bearing surface, and an integrally formed square neck under the head. Dimensions are given in Table 9.

1.2.10 T-Head Bolt. The T-head bolt shall have a rectangular head with a rounded top surface and a flat bearing surface. Dimensions are given in Table 10.

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1.3 Dimensions

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

1.4 Terminology

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

1.5 Referenced Standards

Referenced ASTM standards may be obtained from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.

Referenced SAE standards may be obtained from the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2 GENERAL DATA

2.1 Heads

2.1.1 Height of Head. The height of head shall be measured, parallel to the axis of bolt, from the top of the head to the bearing surface for flat bearing surface type heads, and from the top of the head to the point of intersection of the conical bearing surface of the head with the flat of square neck or the body diameter, whichever is applicable, for countersunk heads.

2.1.2 Head Periphery. Because the heads on these products normally are not machined or trimmed, the circumference may be somewhat irregular and the edge may be rounded or flat.

2.1.3 Underhead Fillets. All bolts having flat bearing surface type heads shall have a definite fillet at the junction of head and shank. The minimum radius of fillet shall be equal to one-half of the maximum values specified in the respective dimensional tables. The radius of fillet shall not exceed the values specified in the respective dimensional tables except for bolts produced from nonferrous and corrosion-resistant materials, on which maximum fillets shall be subject to agreement between manufacturer and purchaser.

2.2 Square Neck

2.2.1 Depth of Square. The depth of square shall be measured, parallel to the axis of bolt at the midpoint of the flats of square, from the bottom of square to the bearing surface for bolts having flat bearing surface type heads, and to the intersection of flats of square with the conical bearing surface for bolts having countersunk heads.

2.2.2 Corners of Square. The corners of square neck may be rounded to the extent specified in the respective dimensional tables and need not be filled out for the total depth of square.

2.3 Diameter of Body

2.3.1 Full Diameter Body. Unless otherwise specified, all bolts covered by this Standard, except round head short square neck bolts, will be furnished with full diameter body of limits given in the dimensional tables.

2.3.2 Reduced Diameter Body. Round head short square neck bolts are, unless otherwise specified, furnished with reduced diameter body having a minimum limit equal to the minimum pitch diameter of the thread. The other types of bolts covered by this Standard in sizes up to and including ½ in. and length combinations of 6 in. or shorter, are also available in reduced diameter body where so specified. On products threaded full length, the diameter of unthreaded shank under the head or neck shall not be less than that of reduced diameter body.

2.3.3 Swell or Fin. A swell or fin under the head or under corners of square neck shall be permissible provided it does not affect serviceability, nor exceed the basic bolt diameter by more than the following:

0.030 in. for sizes up to and including ½ in.
0.050 in. for sizes over ½ in. to ¾ in., inclusive
0.063 in. for sizes over ¾ in. to 1¼ in., inclusive
0.093 in. for sizes over 1¼ in.

2.4 Length

2.4.1 Measurement. The length of the bolt shall be measured, parallel to the axis of the bolt, from the end of the bolt to the bearing surface for bolts having flat bearing surface type heads, and to the top of the head for bolts having countersunk type heads.

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2.4.2 Tolerance on Length. The tolerance on length of bolts shall be as tabulated below:

Nominal Bolt Size	No. 10 thru 3/8	7/16 and 1/2	9/16 thru 3/4	7/8 and 1	1-1/8 thru 1-1/2
Nominal Bolt Length	Tolerance on Length				
Up to 1 in. incl.	+0.02 −0.03	+0.02 −0.03	+0.02 −0.03	– –	– –
Over 1 in. to 2½ in., incl.	+0.02 −0.04	+0.04 −0.05	+0.06 −0.08	+0.08 −0.10	+0.12 −0.12
Over 2½ in. to 4 in., incl.	+0.04 −0.06	+0.06 −0.08	+0.08 −0.10	+0.10 −0.14	+0.16 −0.16
Over 4 in. to 6 in., incl.	+0.06 −0.10	+0.08 −0.10	+0.10 −0.10	+0.12 −0.16	+0.18 −0.18
Over 6 in.	+0.10 −0.18	+0.12 −0.18	+0.14 −0.18	+0.16 −0.20	+0.22 −0.22

2.4.3 Straightness. The shanks of bolts shall be straight within the limitations tabulated below:

Nominal Bolt Length	Allowable Camber Per Inch of Bolt Length
	Max
Up to 12 in., incl.	0.006
Over 12 in. to 24 in., incl.	0.008

The length of any permissible swell on the body under head or neck of bolts shall be excluded from checks for shank straightness. A suggested gage and a gaging procedure for checking straightness are shown in Appendix A.

2.5 Threads

Threads shall be Unified Coarse (UNC or UNRC Series), Class 2A, in accordance with ASME B1.1, Unified Inch Screw Threads (UN and UNR Thread Form). For threads with additive finish, the maximum diameters of Class 2A shall apply before plating or coating, and the basic diameters (Class 2A maximum diameters plus the allowance) shall apply after plating or coating.

Unless otherwise specified, gaging for screw thread dimensional acceptability shall be in accordance with Gaging System 21 as specified in ANSI/ASME B1.3M, Screw Thread Gaging Systems for Dimensional Acceptability — Inch and Metric Screw Threads (UN, UNR, UNJ, M, and MJ).

2.6 Length of Thread

2.6.1 Measurement. The length of thread shall be measured, parallel to the axis of the bolt, from the end of the bolt to the last complete (full form) thread.

2.6.2 Minimum Thread Length. The minimum length of thread shall be equal to twice the basic bolt diameter plus 0.25 in. for nominal bolt lengths of 6 in. or shorter, and twice the basic bolt diameter plus 0.50 in. for longer nominal lengths.

Bolts of nominal lengths too short to accommodate the minimum thread lengths shall be threaded for full length. The length from the head or neck to the first complete (full form) thread shall not exceed the length of 2½ threads for sizes up to and including 1 in., and 3½ threads for sizes over 1 in.

2.7 Points

Bolts need not be pointed.

2.8 Material

2.8.1 Steel. Unless otherwise specified, chemical and mechanical properties of steel bolts, except step bolts and elevator bolts, shall conform to Grade A of ASTM A307, Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength, or to Grade 1 of SAE J429, Mechanical and Material Requirements of Externally Threaded Fasteners. Cold-headed bolts of non-heat-treated grades shall be stress-relieved. Due to peculiarities of the head configurations, steel step bolts and elevator bolts may have tensile strength in pounds of approximately 90% of the values indicated in the ASTM and SAE specifications.

2.8.2 Other Materials. Nonferrous materials are covered in ASTM F468, Nonferrous Bolts, Hex Cap Screws and Studs for General Use. Corrosion-resistant steels are covered in ASTM F593, Stainless Steel Bolts, Hex Cap Screws, and Studs.

2.9 Identification Symbols

2.9.1 Grade Symbols. Each of the products included in this Standard shall be marked in accordance with the requirements of the applicable specification for its chemistry and mechanical properties.

2.9.2 Source Symbols. Each of the products included in this Standard shall be marked to identify the source accepting responsibility for the conformance of the bolt to this and other applicable specifications.

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2.10 Finish

Unless otherwise specified, round head bolts shall be supplied with natural (as processed) finish, unplated or uncoated.

2.11 Workmanship

Bolts shall be free from surface imperfections such as burrs, seams, laps, loose scale, and other surface irregularities which could affect serviceability.

When engineering requirements of the application require control of surface discontinuities, the purchaser shall specify conformance to ASTM F788/F788M, Surface Discontinuities of Bolts, Screws, and Studs, Inch and Metric Series, in the original inquiry and purchase order.

2.12 Quality Assurance

Unless otherwise specified, acceptability shall be determined in accordance with ASME/ANSI B18.18.1M, Inspection and Quality Assurance for General Purpose Fasteners, with inspection level B for thread acceptability.

2.13 Designation

Round head bolts shall be designated by the following data in the sequence shown: nominal size (number, fraction, or decimal equivalent); threads per inch; nominal length (fraction or decimal equivalent); product name; material; and protective finish, if required. See examples below:

$\frac{1}{2}$ – 13 × 3 Round Head Square Neck Bolt, Steel

.375 – 16 × 2.50 Step Bolt, Steel, Zinc Plated

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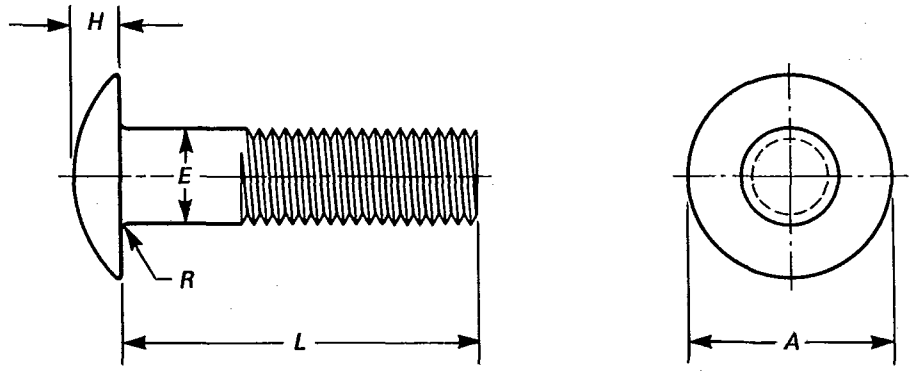


TABLE 1 DIMENSIONS OF ROUND HEAD BOLTS

Nominal Size[1] or Basic Bolt Diameter		*E* Body Diameter		*A* Head Diameter		*H* Head Height		*R* Fillet Radius
		Max.	Min.	Max.	Min.	Max.	Min.	Max[2]
No. 10	0.1900	0.199	0.182	0.469	0.438	0.114	0.094	0.031
1/4	0.2500	0.260	0.237	0.594	0.563	0.145	0.125	0.031
5/16	0.3125	0.324	0.298	0.719	0.688	0.176	0.156	0.031
3/8	0.3750	0.388	0.360	0.844	0.782	0.208	0.188	0.031
7/16	0.4375	0.452	0.421	0.969	0.907	0.239	0.219	0.031
1/2	0.5000	0.515	0.483	1.094	1.032	0.270	0.250	0.031
5/8	0.6250	0.642	0.605	1.344	1.219	0.344	0.313	0.062
3/4	0.7500	0.768	0.729	1.594	1.469	0.406	0.375	0.062
7/8	0.8750	0.895	0.852	1.844	1.719	0.469	0.438	0.062
1	1.0000	1.022	0.976	2.094	1.969	0.531	0.500	0.062

GENERAL NOTE: For additional requirements refer to General Data.

NOTES:
(1) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(2) The minimum radius is one half of the value shown.

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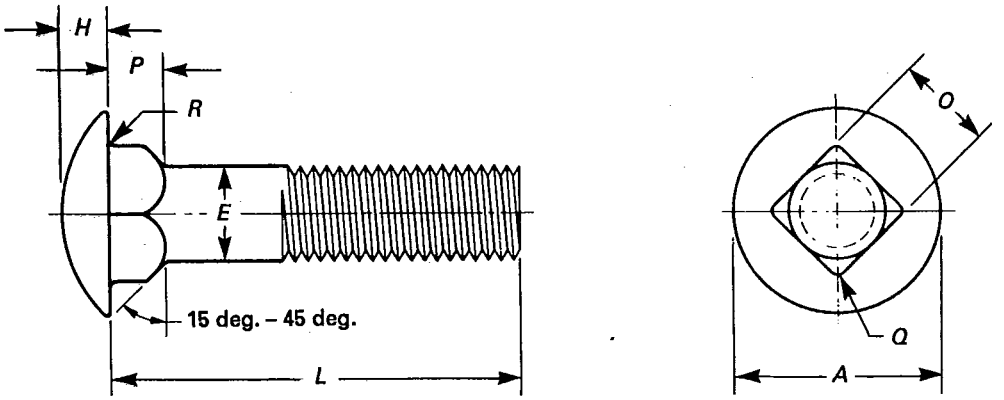


TABLE 2 DIMENSIONS OF ROUND HEAD SQUARE NECK BOLTS

Nominal Size[1] or Basic Bolt Diameter		*E* Body Diameter		*A* Head Diameter		*H* Head Height		*O* Square Width		*P* Square Depth		*Q* Corner Radius on Square	*R* Fillet Radius
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.[2]
No. 10	0.1900	0.199	0.182	0.469	0.436	0.114	0.094	0.199	0.185	0.125	0.094	0.031	0.031
1/4	0.2500	0.260	0.237	0.594	0.563	0.145	0.125	0.260	0.245	0.156	0.125	0.031	0.031
5/16	0.3125	0.324	0.298	0.719	0.688	0.176	0.156	0.324	0.307	0.187	0.156	0.031	0.031
3/8	0.3750	0.388	0.360	0.844	0.782	0.208	0.188	0.388	0.368	0.219	0.188	0.047	0.031
7/16	0.4375	0.452	0.421	0.969	0.907	0.239	0.219	0.452	0.431	0.250	0.219	0.047	0.031
1/2	0.5000	0.515	0.483	1.094	1.032	0.270	0.250	0.515	0.492	0.281	0.250	0.047	0.031
5/8	0.6250	0.642	0.605	1.344	1.219	0.344	0.313	0.642	0.616	0.344	0.313	0.078	0.062
3/4	0.7500	0.768	0.729	1.594	1.469	0.406	0.375	0.768	0.741	0.406	0.375	0.078	0.062
7/8	0.8750	0.895	0.852	1.844	1.719	0.459	0.438	0.895	0.865	0.469	0.438	0.094	0.062
1	1.0000	1.022	0.976	2.094	1.969	0.531	0.500	1.022	0.990	0.531	0.500	0.094	0.062

GENERAL NOTE: For additional requirements refer to General Data.

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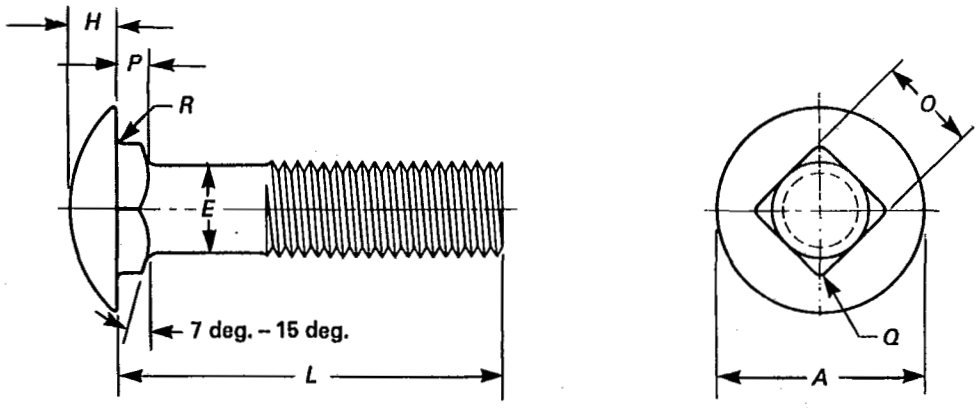


TABLE 3 DIMENSIONS OF ROUND HEAD SHORT SQUARE NECK BOLTS

Nominal Size[1] or Basic Bolt Diameter		*E* Body Diameter		*A* Head Diameter		*H* Head Height		*O* Square Width		*P* Square Depth		*Q* Corner Radius on Square	*R* Fillet Radius
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.[2]
1/4	0.2500	0.260	0.213	0.594	0.563	0.145	0.125	0.260	0.245	0.124	0.093	0.031	0.031
5/16	0.3125	0.324	0.272	0.719	0.688	0.176	0.156	0.324	0.307	0.124	0.093	0.031	0.031
3/8	0.3750	0.388	0.329	0.844	0.782	0.208	0.188	0.388	0.368	0.156	0.125	0.047	0.031
7/16	0.4375	0.452	0.385	0.969	0.907	0.239	0.219	0.452	0.431	0.156	0.125	0.047	0.031
1/2	0.5000	0.515	0.444	1.094	1.032	0.270	0.250	0.515	0.492	0.156	0.125	0.047	0.031
5/8	0.6250	0.642	0.559	1.344	1.219	0.344	0.313	0.642	0.616	0.218	0.187	0.078	0.062
3/4	0.7500	0.768	0.678	1.594	1.469	0.406	0.375	0.768	0.741	0.218	0.187	0.078	0.062

GENERAL NOTE: For additional requirements refer to General Data.

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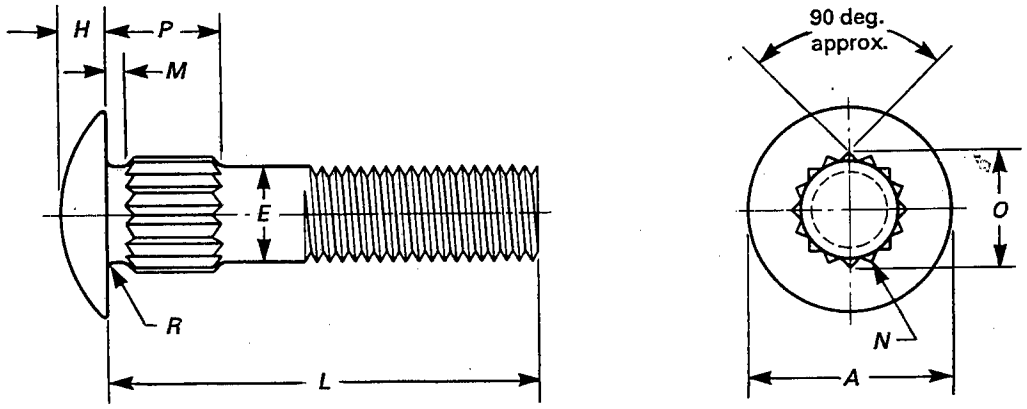


TABLE 4 DIMENSIONS OF ROUND HEAD RIBBED NECK BOLTS

Nominal Size[1] or Basic Bolt Diameter		E		A		H		M		N	O	P			R
		Body Diameter		Head Diameter		Head Height		Head to Ribs For Lengths of		Number of Ribs,	Diameter Over Ribs	Depth Over Ribs For Lengths of			Fillet Radius
								7/8 and Shorter	1 in. and Longer			7/8 and Shorter	1 in. and 1 1/8	1/4 and Longer	
		Max.	Min.	Max.	Min.	Max.	Min.	±0.031[2]		Approx.	Min.		±0.031		Max.[3]
No. 10	0.1900	0.199	0.182	0.469	0.438	0.114	0.094	0.031[2]	0.063	9	0.210	0.250	0.407	0.594	0.031
1/4	0.2500	0.260	0.237	0.594	0.563	0.145	0.125	0.031[2]	0.063	10	0.274	0.250	0.407	0.594	0.031
5/16	0.3125	0.324	0.298	0.719	0.688	0.176	0.156	0.031[2]	0.063	12	0.340	0.250	0.407	0.594	0.031
3/8	0.3750	0.388	0.360	0.844	0.782	0.208	0.188	0.031[2]	0.063	12	0.405	0.250	0.407	0.594	0.031
7/16	0.4375	0.452	0.421	0.969	0.907	0.239	0.219	0.031[2]	0.063	14	0.470	0.250	0.407	0.594	0.031
1/2	0.5000	0.515	0.483	1.094	1.032	0.270	0.250	0.031[2]	0.063	16	0.534	0.250	0.407	0.594	0.031
5/8	0.6250	0.642	0.605	1.344	1.219	0.344	0.313	0.094	0.094	19	0.660	0.313	0.438	0.625	0.062
3/4	0.7500	0.768	0.729	1.594	1.469	0.406	0.375	0.094	0.094	22	0.785	0.313	0.438	0.625	0.062

GENERAL NOTE: For additional requirements refer to General Data.

NOTES:
(1) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(2) Tolerance on the No. 10 through 1/2 in. sizes for nominal lengths 7/8 in. and shorter shall be +0.031 and −0.000.
(3) The minimum radius is one half of the value shown.

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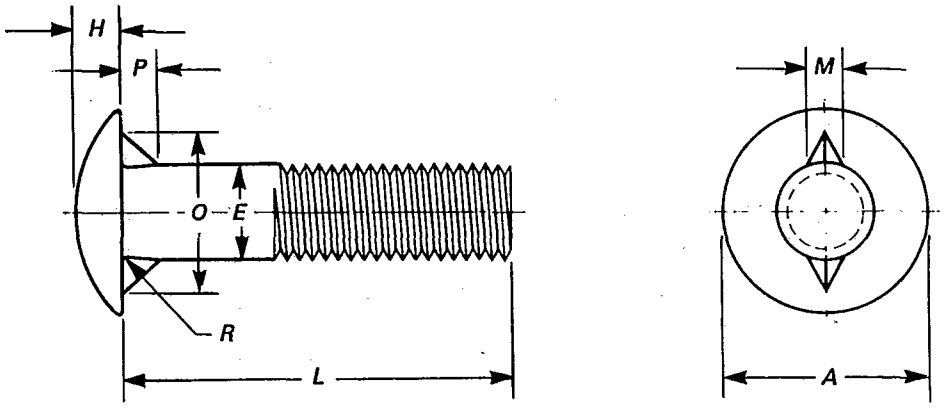


TABLE 5 DIMENSIONS OF ROUND HEAD FIN NECK BOLTS

Nominal Size[1] or Basic Bolt Diameter		E Body Diameter		A Head Diameter		H Head Height		M Fin Thickness		O Distance Across Fins		P Fin Depth		R Fillet Radius
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.[2]
No. 10	0.1900	0.199	0.182	0.469	0.438	0.114	0.094	0.098	0.078	0.395	0.375	0.088	0.076	0.031
1/4	0.2500	0.260	0.237	0.594	0.563	0.145	0.125	0.114	0.094	0.458	0.438	0.104	0.094	0.031
5/16	0.3125	0.324	0.298	0.719	0.688	0.176	0.156	0.145	0.125	0.551	0.531	0.135	0.125	0.031
3/8	0.3750	0.388	0.360	0.844	0.782	0.208	0.188	0.161	0.141	0.645	0.625	0.151	0.141	0.031
7/16	0.4375	0.452	0.421	0.969	0.907	0.239	0.219	0.192	0.172	0.739	0.719	0.182	0.172	0.031
1/2	0.5000	0.515	0.483	1.094	1.032	0.270	0.250	0.208	0.188	0.833	0.813	0.198	0.188	0.031

GENERAL NOTE: For additional requirements refer to General Data.

NOTES:
(1) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(2) The minimum radius is one half of the value shown.

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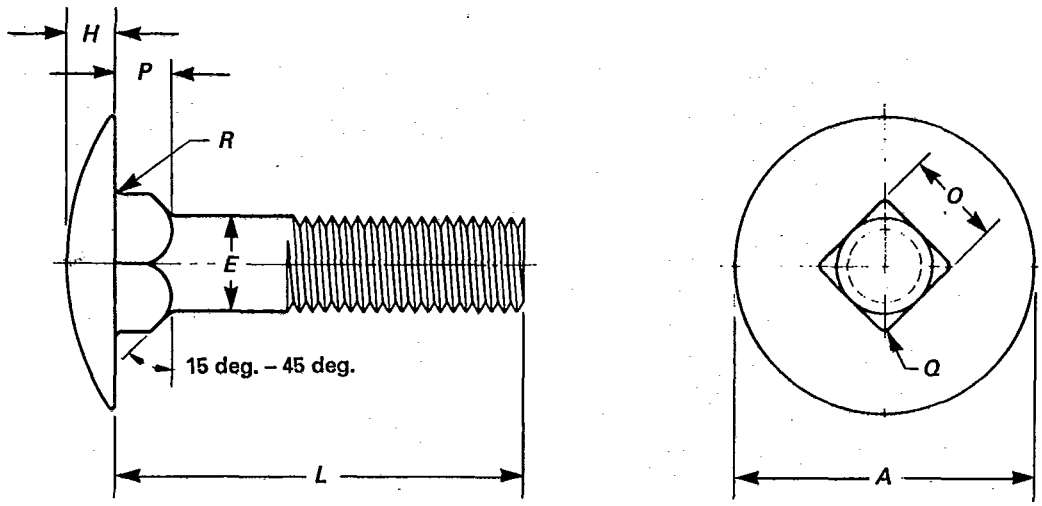


TABLE 6 DIMENSIONS OF STEP BOLTS

Nominal Size[1] or Basic Bolt Diameter		E		A		H		O		P		Q	R
		Body Diameter		Head Diameter		Head Height		Square Width		Square Depth		Corner Radius on Square	Fillet Radius
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.[2]
No. 10	0.1900	0.199	0.182	0.656	0.625	0.114	0.094	0.199	0.185	0.125	0.094	0.031	0.031
1/4	0.2500	0.260	0.237	0.844	0.813	0.145	0.125	0.260	0.245	0.156	0.125	0.031	0.031
5/16	0.3125	0.324	0.298	1.031	1.000	0.176	0.156	0.324	0.307	0.187	0.156	0.031	0.031
3/8	0.3750	0.388	0.360	1.219	1.188	0.208	0.188	0.388	0.368	0.219	0.188	0.047	0.031
7/16	0.4375	0.452	0.421	1.406	1.375	0.239	0.219	0.452	0.431	0.250	0.219	0.047	0.031
1/2	0.5000	0.515	0.483	1.594	1.563	0.270	0.250	0.515	0.492	0.281	0.250	0.047	0.031

GENERAL NOTE: For additional requirements refer to General Data.

NOTES:
(1) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(2) The minimum radius is one half of the value shown.

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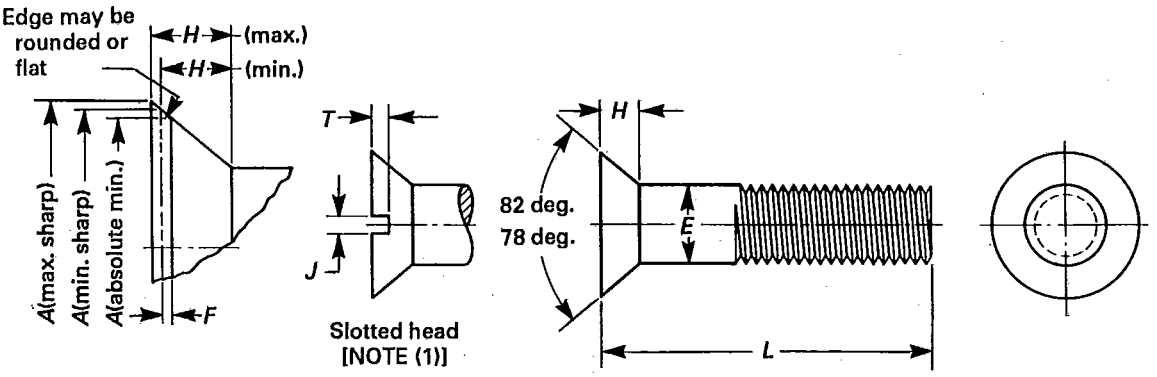


TABLE 7 DIMENSIONS OF COUNTERSUNK BOLTS AND SLOTTED COUNTERSUNK BOLTS[1]

Nominal Size[1] or Basic Bolt Diameter		E		A			F[2]	H		J[3]		T[3]	
		Body Diameter		Head Diameter			Flat on Min. Dia. Head	Head Height		Slot Width		Slot Depth	
				Max. Edge Sharp[4]	Min. Edge Sharp[5]	Absolute Min. Edge Rounded or Flat							
		Max.	Min.				Max.	Max.	Min.	Max.	Min.	Max.	Min.
1/4	0.2500	0.260	0.237	0.493	0.477	0.445	0.018	0.150	0.131	0.075	0.064	0.068	0.045
5/16	0.3125	0.324	0.298	0.618	0.598	0.558	0.023	0.189	0.164	0.084	0.072	0.086	0.057
3/8	0.3750	0.388	0.360	0.740	0.715	0.668	0.027	0.225	0.196	0.094	0.081	0.103	0.068
7/16	0.4375	0.452	0.421	0.803	0.778	0.726	0.030	0.226	0.196	0.094	0.081	0.103	0.068
1/2	0.5000	0.515	0.483	0.935	0.905	0.845	0.035	0.269	0.233	0.106	0.091	0.103	0.068
5/8	0.6250	0.642	0.605	1.169	1.132	1.066	0.038	0.336	0.292	0.133	0.116	0.137	0.091
3/4	0.7500	0.768	0.729	1.402	1.357	1.285	0.041	0.403	0.349	0.149	0.131	0.171	0.115
7/8	0.8750	0.895	0.852	1.637	1.584	1.511	0.042	0.470	0.408	0.167	0.147	0.206	0.138
1	1.0000	1.022	0.976	1.869	1.810	1.735	0.043	0.537	0.466	0.188	0.166	0.240	0.162
1 1/8	1.1250	1.149	1.098	2.104	2.037	1.962	0.043	0.604	0.525	0.196	0.178	0.257	0.173
1 1/4	1.2500	1.277	1.223	2.337	2.262	2.187	0.043	0.671	0.582	0.211	0.193	0.291	0.197
1 3/8	1.3750	1.404	1.345	2.571	2.489	2.414	0.043	0.738	0.641	0.226	0.208	0.326	0.220
1 1/2	1.5000	1.531	1.470	2.804	2.715	2.640	0.043	0.805	0.698	0.258	0.240	0.360	0.244

GENERAL NOTE: For additional requirements refer to General Data.

NOTES:
(1) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(2) Flat on minimum diameter head calculated on minimum sharp and absolute minimum head diameters and 82 deg. head angle.
(3) Head shall be unslotted, unless otherwise specified. Slot dimensions are same as Slotted Flat Countersunk Head Cap Screws in American National Standard, ANSI B18.6.2.
(4) Maximum head height calculated on maximum sharp head diameter, basic bolt diameter and 78 deg. head angle.
(5) Minimum head height calculated on minimum sharp head diameter, basic bolt diameter and 82 deg. head angle.

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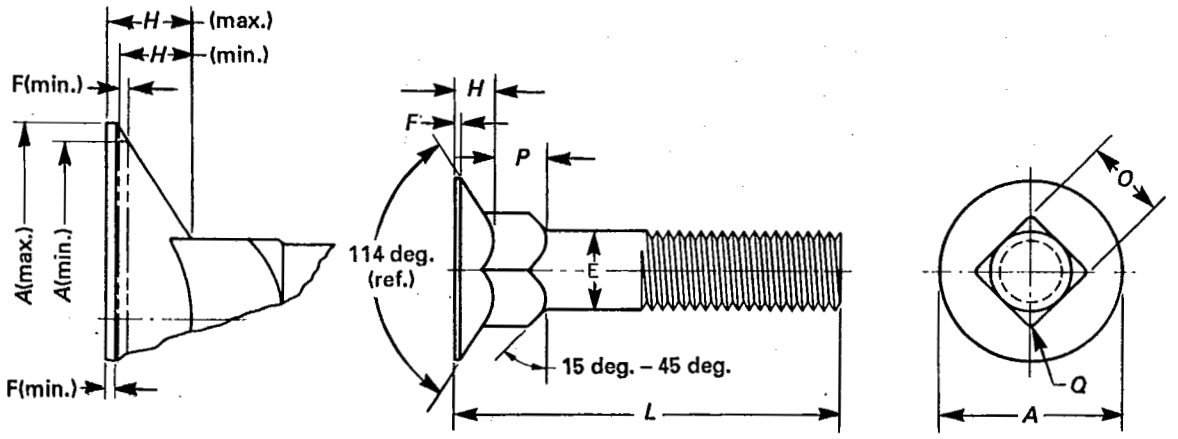


TABLE 8 DIMENSIONS OF 114 DEG COUNTERSUNK SQUARE NECK BOLTS

Nominal Size[1] or Basic Bolt Diameter		E		A		F	H		O		P		Q
		Body Diameter		Head Diameter		Flat On Head	Head Height		Square Width		Square Depth		Corner Radius on Square
		Max.	Min.	Max.	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
No. 10	0.1900	0.199	0.182	0.548	0.500	0.015	0.131	0.112	0.199	0.185	0.125	0.094	0.031
1/4	0.2500	0.260	0.237	0.682	0.625	0.018	0.154	0.135	0.260	0.245	0.156	0.125	0.031
5/16	0.3125	0.324	0.298	0.821	0.750	0.023	0.184	0.159	0.324	0.307	0.219	0.188	0.031
3/8	0.3750	0.388	0.360	0.960	0.875	0.027	0.212	0.183	0.388	0.368	0.250	0.219	0.047
7/16	0.4375	0.452	0.421	1.093	1.000	0.030	0.235	0.205	0.452	0.431	0.281	0.250	0.047
1/2	0.5000	0.515	0.483	1.233	1.125	0.035	0.265	0.229	0.515	0.492	0.312	0.281	0.047
5/8	0.6250	0.642	0.605	1.495	1.375	0.038	0.316	0.272	0.642	0.616	0.406	0.375	0.078
3/4	0.7500	0.768	0.729	1.754	1.625	0.041	0.368	0.314	0.768	0.741	0.500	0.469	0.078

GENERAL NOTE: For additional requirements refer to General Data.

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

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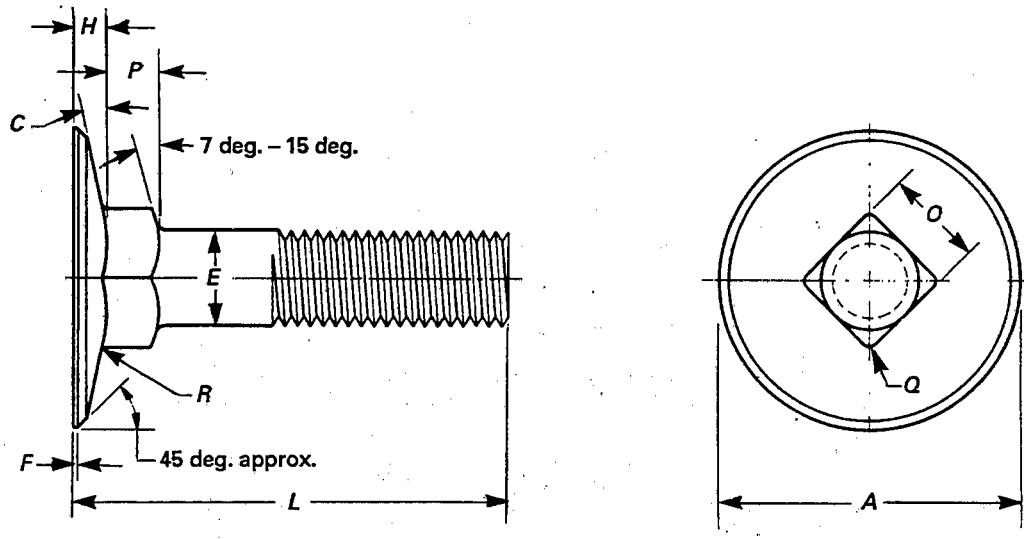


TABLE 9 DIMENSIONS OF FLAT COUNTERSUNK HEAD ELEVATOR BOLTS

Nominal Size[1] or Basic Bolt Diameter		E		A			C	F	H		O		P		Q	R
		Body Diameter		Head Diameter			Head Angle	Flat on Min. Dia. Head	Head Height		Square Width		Square Depth		Corner Radius on Square	Fillet Radius
				Max. Edge Sharp	Min. Edge Sharp	Min. Edge Flat										
		Max.	Min.				Ref.	Max.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Max.[2]
No. 10	0.1900	0.199	0.182	0.790	0.750	0.740	9°	0.025	0.082	0.062	0.210	0.185	0.125	0.094	0.031	0.031
1/4	0.2500	0.260	0.237	1.008	0.969	0.938	9°	0.035	0.098	0.078	0.280	0.245	0.219	0.188	0.031	0.031
5/16	0.3125	0.324	0.298	1.227	1.188	1.157	9°	0.035	0.114	0.094	0.342	0.307	0.250	0.219	0.031	0.031
3/8	0.3750	0.388	0.360	1.352	1.312	1.272	11°	0.040	0.145	0.125	0.405	0.368	0.250	0.219	0.047	0.031
7/16	0.4375	0.452	0.421	1.477	1.438	1.397	13°	0.040	0.176	0.156	0.468	0.431	0.281	0.250	0.047	0.031
1/2	0.5000	0.515	0.483	1.602	1.562	1.522	12°	0.040	0.176	0.156	0.530	0.492	0.281	0.250	0.047	0.031

GENERAL NOTE: For additional requirements refer to General Data.

NOTES:
(1) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(2) The minimum radius is one half of the value shown.

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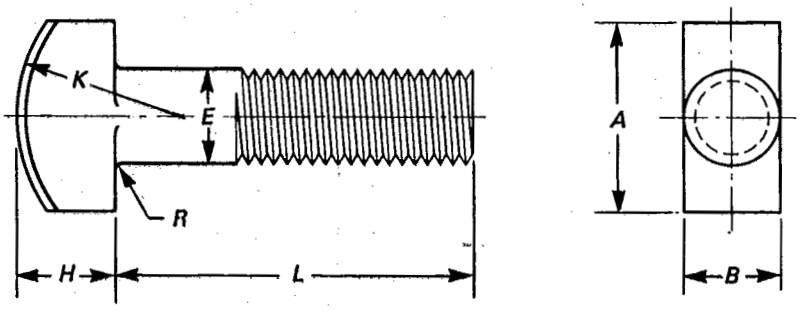


TABLE 10 DIMENSIONS OF T-HEAD BOLTS

Nominal Size[1] or Basic Bolt Diameter		E Body Diameter		A Head Length		B Head Width		H Head Height		K Head Radius	R Fillet Radius
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Basic	Max.[2]
1/4	0.2500	0.260	0.237	0.500	0.488	0.280	0.245	0.204	0.172	0.438	0.031
5/16	0.3125	0.324	0.298	0.625	0.609	0.342	0.307	0.267	0.233	0.500	0.031
3/8	0.3750	0.388	0.360	0.750	0.731	0.405	0.368	0.331	0.295	0.625	0.031
7/16	0.4375	0.452	0.421	0.875	0.853	0.468	0.431	0.394	0.356	0.875	0.031
1/2	0.5000	0.515	0.483	1.000	0.975	0.530	0.492	0.458	0.418	0.875	0.031
5/8	0.6250	0.642	0.605	1.250	1.218	0.675	0.616	0.585	0.541	1.062	0.062
3/4	0.7500	0.768	0.729	1.500	1.462	0.800	0.741	0.649	0.601	1.250	0.062
7/8	0.8750	0.895	0.852	1.750	1.706	0.938	0.865	0.776	0.724	1.375	0.062
1	1.0000	1.022	0.976	2.000	1.950	1.063	0.990	0.903	0.847	1.500	0.062

GENERAL NOTE: For additional requirements refer to General Data.

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

GAGES AND GAGING FOR CHECKING BOLT STRAIGHTNESS

(This Appendix is not part of ASME B18.5-1990, and is included here for information purposes only.)

The conformance of bolts to shank straightness or camber limitations set forth in the bolt specifications may be checked by use of the typical gage illustrated in Fig. A1 in accordance with the following procedure.

Allowable total camber on the bolt to be inspected shall be calculated by multiplying the specified permissible camber per inch of length by the nominal bolt length expressed as a two-place decimal. The total camber thus derived shall be added to the specified maximum body diameter and the movable rail of the gage shall be adjusted to provide a parallel space between the rails equal to this distance by obtaining common readings on both micrometer heads. The movable rail shall then be locked in place by tightening securing screws.

The bolt shall then be inserted between the rails, excluding from the gage any permissible length of swell or fin under the head or neck. The bolt shall next be rotated by hand through a full 360 deg. Any interference occurring between the bolt and the gage which is sufficient to prevent rotation shall indicate excessive camber.

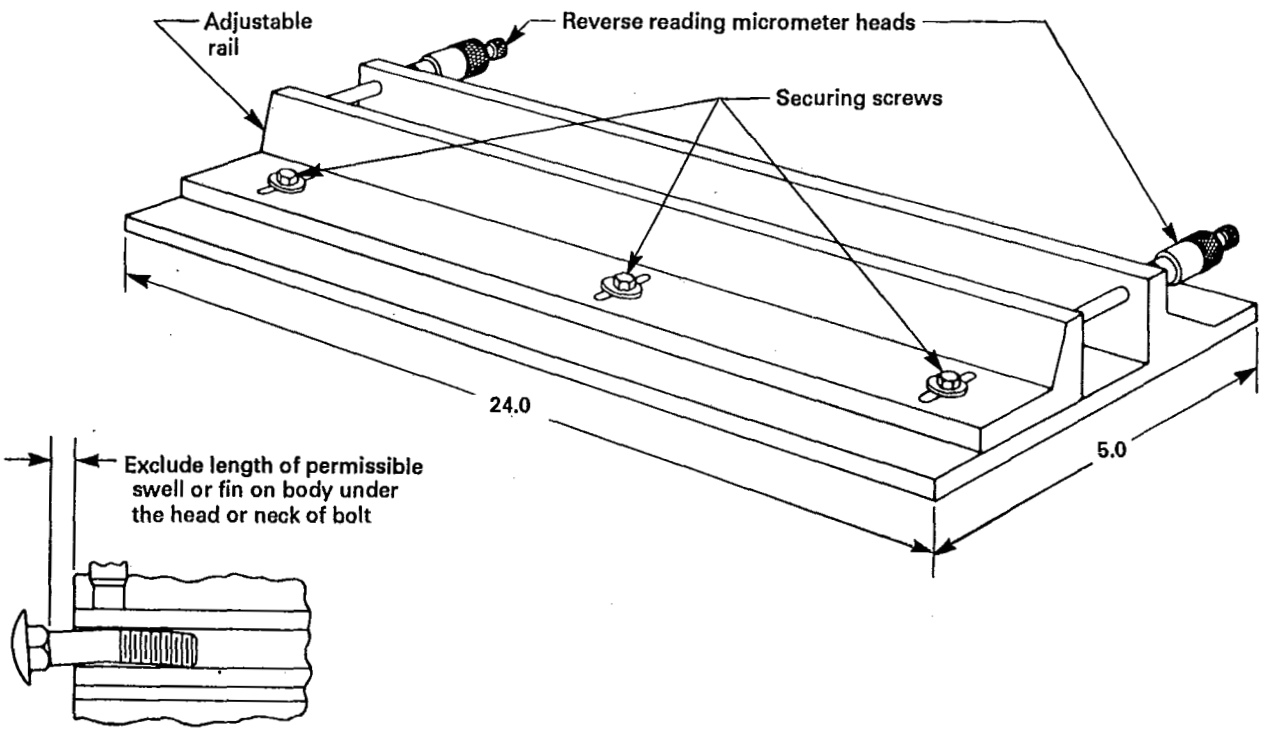


FIG. A1 TYPICAL STRAIGHTNESS GAGE

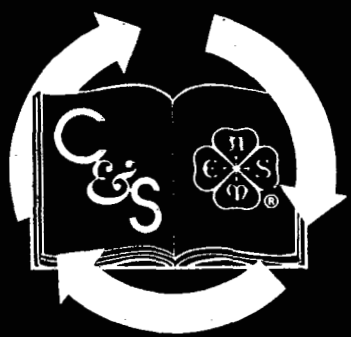
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AMERICAN NATIONAL STANDARDS FOR BOLTS, NUTS, RIVETS, SCREWS, WASHERS, AND SIMILAR FASTENERS

Small Solid Rivets ..... B18.1.1-1972(R1989)
Large Rivets ..... B18.1.2-1972(R1989)
Metric Small Solid Rivets ..... B18.1.3M-1983(R1989)
Square and Hex Bolts and Screws — Inch Series B18.2.1-1981
Square and Hex Nuts (Inch Series) B18.2.2-1987
Metric Hex Cap Screws ..... B18.2.3.1M-1979(R1989)
Metric Formed Hex Screws ..... B18.2.3.2M-1979(R1989)
Metric Heavy Hex Screws ..... B18.2.3.3M-1979(R1989)
Metric Hex Flange Screws B18.2.3.4M-1984
Metric Hex Bolts ..... B18.2.3.5M-1979(R1989)
Metric Heavy Hex Bolts ..... B18.2.3.6M-1979(R1989)
Metric Heavy Hex Structural Bolts ..... B18.2.3.7M-1979(R1989)
Metric Hex Lag Screws ..... B18.2.3.8M-1981(R1991)
Metric Heavy Hex Flange Screws B18.2.3.9M-1984
Metric Hex Nuts, Style 1 ..... B18.2.4.1M-1979(R1989)
Metric Hex Nuts, Style 2 ..... B18.2.4.2M-1979(R1989)
Metric Slotted Hex Nuts ..... B18.2.4.3M-1979(R1989)
Metric Hex Flange Nuts B18.2.4.4M-1982
Metric Hex Jam Nuts ..... B18.2.4.5M-1979(R1990)
Metric Heavy Hex Nuts ..... B18.2.4.6M-1979(R1990)
Socket Cap, Shoulder and Set Screws — Inch Series B18.3-1986
Socket Head Cap Screws (Metric Series) B18.3.1M-1986
Metric Series Hexagon Keys and Bits ..... B18.3.2M-1979(R1990)
Hexagon Socket Head Shoulder Screws (Metric Series) B18.3.3M-1986
Hexagon Socket Button Head Cap Screws (Metric Series) B18.3.4M-1986
Hexagon Socket Flat Countersunk Head Cap Screws (Metric Series) B18.3.5M-1986
Metric Series Socket Set Screws B18.3.6M-1986
Round Head Bolts (Inch Series) B18.5-1990
Metric Round Head Short Square Neck Bolts B18.5.2.1M-1981
Metric Round Head Square Neck Bolts B18.5.2.2M-1982
Round Head Square Neck Bolts With Large Head (Metric Series) B18.5.2.3M-1990
Wood Screws (Inch Series) B18.6.1-1981
Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws ..... B18.6.2-1972(R1983)
Machine Screws and Machine Screw Nuts ..... B18.6.3-1972(R1983)
Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws (Inch Series) B18.6.4-1981
Metric Thread Forming and Thread Cutting Tapping Screws B18.6.5M-1986
Metric Machine Screws B18.6.7M-1985
General Purpose Semi-Tubular Rivets, Full Tubular Rivets, Split Rivets and Rivet Caps ..... B18.7-1972(R1980)
Metric General Purpose Semi-Tubular Rivets B18.7.1M-1984
Clevis Pins and Cotter Pins ..... B18.8.1-1972(R1983)
Taper Pins, Dowel Pins, Straight Pins, Grooved Pins, and Spring Pins (Inch Series) ..... B18.8.2-1978(R1989)
Spring Pins — Coiled Type (Metric Series) B18.8.3M-1990
Plow Bolts ..... B18.9-1958(R1989)
Track Bolts and Nuts B18.10-1982
Miniature Screws ..... B18.11-1961(R1983)
Glossary of Terms for Mechanical Fasteners ..... B18.12-1962(R1981)
Screw and Washer Assemblies — Sems (Inch Series) B18.13-1987
Forged Eyebolts B18.15-1985
Mechanical and Performance Requirements for Prevailing-Torque Type Steel Metric Hex Nuts and Hex Flange Nuts ..... B18.16.1M-1979(R1986)
Torque-Tension Test Requirements for Prevailing-Torque Type Steel Metric Hex Nuts and Hex Flange Nuts ..... B18.16.2M-1979(R1986)
Dimensional Requirements for Prevailing-Torque Type Steel Metric Hex Nuts and Hex Flange Nuts ..... B18.16.3M-1982(R1987)
Wing Nuts, Thumb Screws, and Wing Screws ..... B18.17-1968(R1983)
Inspection and Quality Assurance for General Purpose Fasteners B18.18.1M-1987
Inspection and Quality Assurance for High-Volume Machine Assembly Fasteners B18.18.2M-1987
Inspection and Quality Assurance for Special Purpose Fasteners B18.18.3M-1987
Inspection and Quality Assurance for Fasteners for Highly Specialized Engineered Applications B18.18.4M-1987
Lock Washers (Inch Series) B18.21.1-1990
Lock Washers (Metric Series) B18.21.2M-1990
Metric Plain Washers ..... B18.22M-1981(R1990)
Plain Washers ..... B18.22.1-1965(R1990)

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