

ASME B18.31.3-2014
(Revision of ASME B18.31.3-2009)

Threaded Rods (Inch Series)

AN AMERICAN NATIONAL STANDARD



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Mechanical Engineers**

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CONTENTS

Foreword	iv
Committee Roster	v
Correspondence With the B18 Committee	vi
1 Introduction.....	1
2 General Data.....	1
Figure	
1 Threaded Rod Dimensions	2
Table	
1 Inch Threaded Rod Sizes	3



FOREWORD

There was significant interest in developing this Standard due to the antidumping investigation by the U.S. Department of Commerce and the U.S. International Trade Commission that was happening simultaneously. The investigation resulted in antidumping tariffs being applied to a significant portion of threaded rod that is used in the United States. Members of the subcommittee recognized that there would be a lot of new threaded rod manufacturers appearing in the market and that the industry needed a standard to reference on purchasing documents. The Fastener Industry Education Group cites referencing standards as one of the most important criteria for preventing poor quality or wrong product from entering the supply chain.

The first edition of this Standard was approved as an American National Standard on November 10, 2009.

This revision incorporates the following technical changes. For quality assurance, ASME B18.18 replaces the superseded ASME B18.18.2. Additional materials for threaded rod have been added and provision is made to allow users to order materials not specifically covered. Stainless steel is used to identify corrosion-resistant steel fasteners previously identified as CRES. ASTM F1554, Grade 105 that is increasingly replacing ASTM A449 has been added. ASTM A354 and SAE J429, Grade 8 covering higher-strength steels were added. Hot-dip zinc coating in accordance with ASTM F2329 was added as a finish choice. A statement has been added that tensile and yield tests can be conducted on specimens of 3 nominal diameters or greater in length as some of the referenced material specifications may require testing of full length specimens. Table 1 was added to show the nominal sizes (diameters) for inch-size rods with UNC, UNF, 8UN, and Acme thread configurations.

This revision was approved by the American National Standards Institute on November 10, 2014.



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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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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.

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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 that are necessary to explain the question; however, they should not contain proprietary names or information.

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THREADED RODS (INCH SERIES)

1 INTRODUCTION

1.1 Scope

This Standard covers the general and dimensional data for inch series threaded rods. Included are the following thread configurations and diameters:

- (a) UNC threads #4 through 4 in.
- (b) UNF threads #4 through 1½ in.
- (c) 8UN threads 1⅛ in. through 4 in.
- (d) Acme threads ¼ in. through 5 in.

At this time, there are no ISO standards for inch threaded rods.

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

1.2 Dimensions

All dimensions in this Standard are in inches, unless otherwise specified.

1.3 Terminology

For definitions of terminology not specifically defined in this Standard, refer to ASME B18.12.

1.4 Referenced Standards

Unless otherwise specified, the standards referenced shall be the most recent at the time of order placement.

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

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

ASME B1.5, Acme Screw Threads

ASME B18.12, Glossary of Terms for Mechanical Fasteners

ASME B18.18, Quality Assurance for Fasteners

Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900 (www.asme.org)

ASTM A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications

ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

ASTM A354, Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners

ASTM A449, Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use

ASTM F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, Socket Head Cap Screws, and Studs for General Use

ASTM F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

ASTM F788/F788M, Standard Specification for Surface Discontinuities of Bolts, Screws, and Studs, Inch and Metric Series

ASTM F1470, Standard Practice for Fastener Sampling for Specified Mechanical Properties and Performance Inspection

ASTM F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

ASTM F1941, Standard Specification for Electrodeposited Coatings on Threaded Fasteners (Unified Inch Screw Threads (UN/UNR))

ASTM F2329, Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners

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)

SAE J429, Mechanical and Material Requirements for Externally Threaded Fasteners

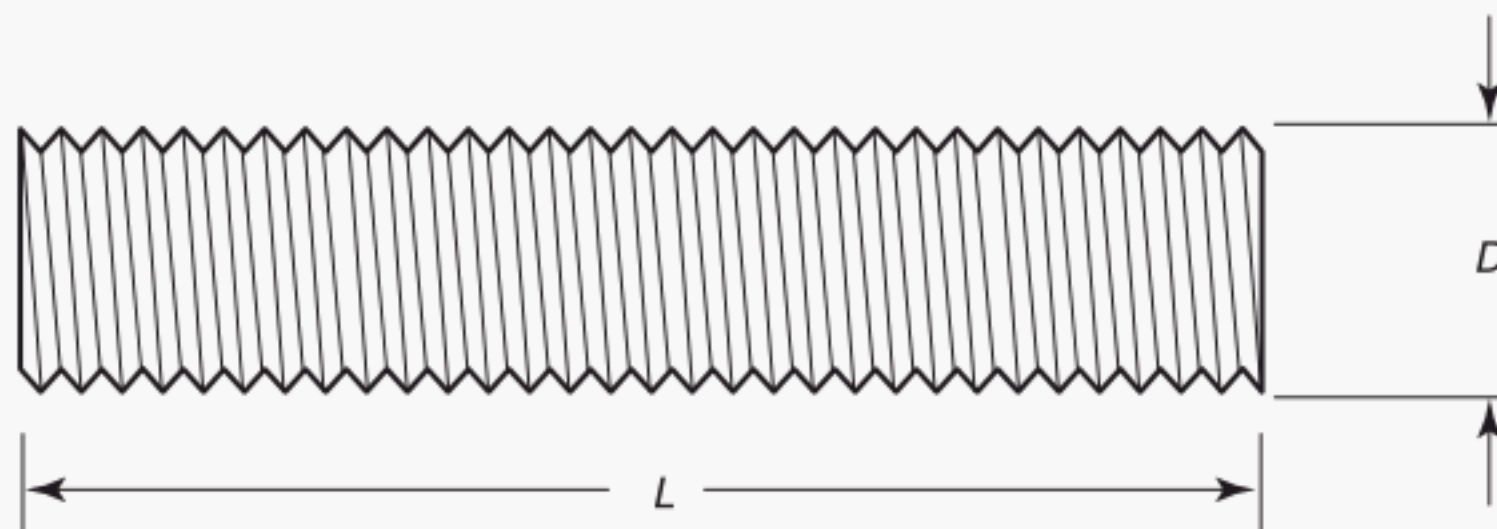
Publisher: SAE International, 400 Commonwealth Drive, Warrendale, PA 15096 (www.sae.org)

2 GENERAL DATA

2.1 Length

Threaded rods are commonly produced in, but not limited to, 3-ft, 6-ft, 10-ft, and 12-ft lengths. The length of the threaded rod shall be measured, overall, from end to end. The length tolerance on all threaded rods in nominal lengths of 6 ft and longer shall be $\pm\frac{1}{2}$ in., and $\pm\frac{1}{4}$ in. for nominal lengths less than 6 ft. See Fig. 1.



Fig. 1 Threaded Rod Dimensions

2.2 Threads

Unified threads shall conform to the requirements of ASME B1.1. For UNC and UNF threads, Class 1A will be furnished unless otherwise specified. Class 2A shall be applicable for 8UN threads and at the manufacturer's option for other series, and for sizes where Class 1A is not applicable. Plated threads shall conform to ASME B1.1, Class 3A high limit (basic) and the low limit requirement of the before-coated or plated thread class.

Acme threads shall meet the requirements of ASME B1.5, Class 2G.

Table 1 contains the thread diameter and threads per inch combinations for Unified and Acme thread sizes considered standard.

2.3 Thread Acceptance Gaging

Unless otherwise specified by the purchaser, gaging for screw thread dimensional acceptability shall be in accordance with Gaging System 21 as specified in ASME B1.3.

2.4 Ends

The ends shall be of sufficient workmanship to allow for easy assembly with an appropriate mating nut.

2.5 Straightness

When required, straightness limits and the inspection technique to be used to evaluate straightness shall be agreed upon between the purchaser and the supplier.

2.6 Materials and Mechanical Requirements

The purchaser must specify the applicable specification for the threaded rod material. The material shall meet the chemical and mechanical properties of the applicable specification. Listed below are some of the primary material specifications for threaded rod. Other materials may be specified by the purchaser.

2.6.1 Steel Threaded Rod

2.6.1.1 Steel. The designation "steel" means low-carbon steel meeting all of the material and mechanical requirements of ASTM A307, Grade A.

2.6.1.2 Grade 36. The designation "Grade 36" means steel material meeting all of the material and

mechanical requirements of ASTM F1554, Grade 36.

NOTE: A designation of "A36" or "ASTM A36" refers to raw material only and is inappropriate as a fastener reference. The purchaser shall use the designation "ASTM A307A" or "ASTM F1554, Grade 36" as required.

2.6.1.3 B7. The designation "B7" means a chromium molybdenum steel meeting all of the material and mechanical requirements of ASTM A193, Grade B7. Other grades of steel for high-temperature applications may be ordered to other grades in ASTM A193/A193M.

2.6.1.4 Other Acceptable Steel Materials for Threaded Rod

(a) Low strength: SAE J429, Grades 1 and 2

(b) Medium strength: ASTM A449, Type 1; ASTM F1554, Grade 105

(c) High strength: ASTM A354, Grades BC and BD; SAE J429, Grade 8

2.6.2 Stainless Steel Threaded Rod

2.6.2.1 Stainless Steel (or SST). The designation "stainless steel" or "SST" means material meeting all of the material and mechanical requirements of ASTM F593, Alloy Group 1, Condition CW.

2.6.2.2 316 Stainless Steel (or 316). The designation "316 stainless steel" or "316" means material meeting all of the material and mechanical requirements of ASTM F593, Alloy Group 2, Condition CW.

2.6.2.3 Other Stainless Steels. Specific alloys of stainless steel threaded rod may be ordered by listing the specific alloy and condition per ASTM F593.

2.6.3 Nonferrous Threaded Rod

2.6.3.1 Brass. The designation "brass" means material meeting all of the material and mechanical requirements for any brass or naval brass of ASTM F468 at the supplier's option.

2.6.3.2 Aluminum. The designation "aluminum" means material meeting all of the material and mechanical requirements of any aluminum in ASTM F468 at the supplier's option.



Table 1 Inch Threaded Rod Sizes

Size	Nominal Diameter	Size and Threads/Inch			
		UNC	8UN	UNF	Acme
#4	0.1120	4-40	...	4-48	...
#5	0.1250	5-40	...	5-44	...
#6	0.1380	6-32	...	6-40	...
#8	0.1640	8-32	...	8-36	...
#10	0.1900	10-24	...	10-32	...
#12	0.2160	12-24	...	12-28	...
1/4	0.2500	1/4-20	...	1/4-28	1/4-16
5/16	0.3125	5/16-18	...	5/16-24	5/16-14
3/8	0.3750	3/8-16	...	3/8-24	3/8-12
7/16	0.4370	7/16-14	...	7/16-20	7/16-12
1/2	0.5000	1/2-13	...	1/2-20	1/2-10
9/16	0.5620	9/16-12	...	9/16-18	...
5/8	0.6250	5/8-11	...	5/8-18	5/8-8
3/4	0.7500	3/4-10	...	3/4-16	3/4-6
7/8	0.8750	7/8-9	...	7/8-14	7/8-6
1	1.0000	1-8	...	1-12 or 1-14 UNS	1-5
1 1/8	1.1250	1 1/8-7	1 1/8-8	1 1/8-12	1 1/8-5
1 1/4	1.2500	1 1/4-7	1 1/4-8	1 1/4-12	1 1/4-5
1 3/8	1.3750	1 3/8-6	1 3/8-8	1 3/8-12	1 3/8-4
1 1/2	1.5000	1 1/2-6	1 1/2-8	1 1/2-12	1 1/2-4
1 5/8	1.6250	...	1 5/8-8	...	...
1 3/4	1.7500	1 3/4-5	1 3/4-8	...	1 3/4-4
1 7/8	1.8750	...	1 7/8-8	...	...
2	2.0000	2-4.5	2-8	...	2-4
2 1/4	2.2500	2 1/4-4.5	2 1/4-8	...	2 1/4-3
2 1/2	2.5000	2 1/2-4	2 1/2-8	...	2 1/2-3
2 3/4	2.7500	2 3/4-4	2 3/4-8	...	2 3/4-3
3	3.0000	3-4	3-8	...	3-2
3 1/4	3.2500	3 1/4-4	3 1/4-8	...	...
3 1/2	3.5000	3 1/2-4	3 1/2-8	...	3 1/2-2
3 3/4	3.7500	3 3/4-4	3 3/4-8	...	...
4	4.0000	4-4	4-8	...	4-2
4 1/2	4.5000	...	...	...	4 1/2-2
5	5.0000	...	...	...	5-2

2.6.3.3 Other Nonferrous Materials. Other nonferrous materials can be ordered by identifying the specific ASTM F468 alloy.

2.6.4 Other Materials and Finishes. Threaded rod of materials and finishes to specifications not identified herein shall be as agreed to between the purchaser and supplier.

2.7 Finishes

The purchaser shall designate the required finish. Unless otherwise specified, plain finish steel rods shall be coated with a light oil to protect them from corrosion during transportation and storage.

Electroplated rods shall be finished in accordance with ASTM F1941.

Hot-dip zinc coating shall be in accordance with ASTM F2329.

2.8 Workmanship

Threaded rods shall be visually inspected, without magnification, to be free of burrs, seams, laps, loose scales, irregular surfaces, and any defects that affect their serviceability. When control of surface discontinuities is required, the purchaser may specify the surface discontinuities shall conform to ASTM F788/F788M or specifically identified purchaser requirements.

2.9 Designation

2.9.1 Threaded rods shall be designated by data in the following sequential order:

- product name
- designation of standard
- nominal size (fractional or decimal equivalent) and threads per inch



(d) thread class, if other than specified in para. 2.2, and LH for left-hand thread, if applicable

(e) product length (specified in feet and/or inches)

(f) material designation or specification and grade/alloy and condition (when applicable) except for those materials specifically identified in para. 2.6

(g) finish (material, standard, and thickness when applicable)

2.9.2 See the following examples:

(a) Threaded rod per ASME B18.31.3, $\frac{1}{2}$ in.-13 \times 10 ft, steel, Fe/Zn 3AT per ASTM F1941

(b) Threaded rod per ASME B18.31.3, $\frac{5}{16}$ in.-18 \times 6 ft, B7, plain finish

(c) Threaded rod per ASME B18.31.3, $\frac{3}{8}$ in.-16 \times 30 in., 316 stainless steel, plain finish

(d) Threaded rod per ASME B18.31.3, 1 in.-5 Acme LH \times 6 ft, steel, plain finish

(e) Threaded rod per ASME B18.31.3, $\frac{1}{2}$ in.-13 \times 12 ft, 304 SST per ASTM F593, Condition CW, plain finish

2.10 Grade Symbol and Manufacturer's Marking

Unless otherwise specified by the purchaser, threaded rods shall be exempt from the marking requirements

of the associated material specification. Packaging and label requirements as mandated in applicable material specifications are required.

2.11 Inspection and Quality Assurance

2.11.1 Dimensional Conformance. Threaded rods shall be inspected to determine conformance with this Standard. Inspection procedures and additional requirements may be specified by the purchaser on the inquiry, purchase order, engineering drawings, or shall be as agreed upon between the purchaser and supplier prior to acceptance of the order. In the absence of a defined agreement, the requirements of ASME B18.18, Category 2 shall apply.

2.12 Materials and Mechanical Conformance

Threaded rods shall comply with the material, mechanical, and test requirements as specified in the material portion of the threaded rod's description on the purchase order. Unless otherwise specified, sampling will be as specified in ASTM F1470. For tensile and yield strength tests, specimen lengths of 3 nominal diameters or longer are permitted in lieu of full-size tests.



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

Small Solid Rivets	B18.1.1-1972 (R2011)
Large Rivets	B18.1.2-1972 (R2011)
Metric Small Solid Rivets	B18.1.3M-1983 (R2011)
Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)	B18.2.1-2012
Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)	B18.2.2-2010
Metric Heavy Hex Screws	B18.2.3.3M-2007 (R2014)
Metric Hex Flange Screws	B18.2.3.4M-2001 (R2011)
Metric Hex Bolts	B18.2.3.5M-1979 (R2011)
Metric Heavy Hex Bolts	B18.2.3.6M-1979 (R2006)
Metric Heavy Hex Flange Screws	B18.2.3.9M-2001 (R2014)
Metric Slotted Hex Nuts	B18.2.4.3M-1979 (R2012)
Metric 12-Point Flange Head Screws	B18.2.5M-2013
Metric Fasteners for Use in Structural Applications	B18.2.6M-2012
Clearance Holes for Bolt, Screws, and Studs	B18.2.8-1999 (R2010)
Straightness Gage and Gaging for Bolts and Screws	B18.2.9-2010
Socket Cap, Shoulder, Set Screws, and Hex Keys (Inch Series)	B18.3-2012
Round Head Bolts (Inch Series)	B18.5-2012
Metric Round Head Short Square Neck Bolts	B18.5.2.1M-2006 (R2011)
Wood Screws (Inch Series)	B18.6.1-1981 (R2008)
Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws (Inch Series)	B18.6.2-1998 (R2010)
Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series)	B18.6.3-2013
Metric Thread-Forming and Thread-Cutting Tapping Screws	B18.6.5M-2000 (R2010)
Metric Machine Screws	B18.6.7M-1999 (R2010)
Thumb Screws and Wing Screws (Inch Series)	B18.6.8-2010
Wing Nuts (Inch Series)	B18.6.9-2010
General Purpose Semi-Tubular Rivets, Full Tubular Rivets, Split Rivets and Rivet Caps	B18.7-2007 (R2012)
Metric General Purpose Semi-Tubular Rivets	B18.7.1M-2007 (R2012)
Clevis Pins and Cotter Pins (Inch Series)	B18.8.1-2014
Taper Pins, Dowel Pins, Straight Pins, Grooved Pins, and Spring Pins (Inch Series)	B18.8.2-2000 (R2010)
Plow Bolts	B18.9-2012
Track Bolts and Nuts	B18.10-2006 (R2011)
Miniature Screws	B18.11-1961 (R2010)
Glossary of Terms for Mechanical Fasteners	B18.12-2012
Screw and Washer Assemblies — Sems (Inch Series)	B18.13-1996 (R2013)
Screw and Washer Assemblies: SEMS (Metric Series)	B18.13.1M-2011
Forged Eyebolts	B18.15-1985 (R2008)
Prevailing-Torque Type Steel Metric Hex Nuts and Hex Flange Nuts	B18.16M-2004 (R2009)
Serrated Hex Flange Locknuts 90,000 psi (Inch Series)	B18.16.4-2008 (R2013)
Prevailing Torque Locknuts (Inch Series)	B18.16.6-2014
Quality Assurance for Fasteners	B18.18-2011
Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)	B18.21.1-2009
Lock Washers (Metric Series)	B18.21.2M-1999 (R2014)
Double Coil Helical Spring Lock Washers for Wood Structures	B18.21.3-2008 (R2013)
Metric Plain Washers	B18.22M-1981 (R2010)
Part Identifying Number (PIN) Code System for B18 Fastener Products	B18.24-2004
Tapered and Reduced Cross Section Retaining Rings (Inch Series)	B18.27-1998 (R2011)
Helical Coil Screw Thread Inserts — Free Running and Screw Locking (Inch Series)	B18.29.1-2010
Helical Coil Screw Thread Inserts: Free Running and Screw Locking (Metric Series)	B18.29.2M-2005 (R2010)
Metric Continuous and Double-End Studs	B18.31.1M-2008
Continuous Thread Stud, Double-End Stud, and Flange Bolting Stud (Stud Bolt) (Inch Series)	B18.31.2-2014
Threaded Rods (Inch Series)	B18.31.3-2014
Threaded Rod (Metric Series)	B18.31.4M-2009
Bent Bolts (Inch Series)	B18.31.5-2011

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