

ASME B18.31.4M-2009

Threaded Rod (Metric Series)

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FOREWORD

In September 2008, ASME B18 Subcommittee 31 received a request to develop a standard for inch dimensioned threaded rod. This resulted in the development and balloting of a draft for ASME B18.31.3, Threaded Rod (Inch Series). Subsequently it was decided that a companion document for metric threaded rod should be developed. Although threaded rod is widely available in the marketplace, there were no current ISO or American National Standards for threaded rod. DOD-S-63543 and DOD-S-63543/2 specifications, covering metric threaded rod in several materials, were cancelled in 1995.

This Standard specifically identifies many of the most common materials and coatings available in threaded rod but is also applicable to other materials and coatings as specified by a purchaser. Standard lengths are identified but this Standard permits other lengths to be ordered.

The first draft was balloted in March 2009 with a single disapproval. Subcommittee 31 adjudicated the comments and agreed to make several changes. The changes were balloted and approved by B18 Subcommittee 31 and by the B18 Standards Committee with the closure of a ballot in August 2009. This Standard was approved by the American National Standards Institute on December 2, 2009.

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Standardization of Bolts, Nuts, Rivets, Screws, Washers, and Similar Fasteners

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

THREADED ROD (METRIC SERIES)

1 INTRODUCTION

This Standard covers the complete general and dimensional data for metric series threaded rod recognized as an American National Standard. This Standard is applicable to both fine and coarse metric series threads of diameters from M1.6 to M56, as indicated in Table 1.

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.

2 COMPARISON TO ISO DOCUMENTS

At this time there are no ISO standards for metric series threaded rods.

3 REFERENCED STANDARDS

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

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

ASME B1.13M, Metric Screw Threads — M Profile

ASME B18.12, Glossary of Terms for Mechanical Fasteners

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

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300 (www.asme.org)

ASTM A 193/A 193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications

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

ASTM F 468M, Nonferrous Bolts, Hex Cap Screws, and Studs for General Use [Metric]

ASTM F 568M, Carbon and Alloy Steel Externally Threaded Metric Fasteners

ASTM F 738M, Stainless Steel Metric Bolts, Screws, and Studs

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

ASTM F 1470, Standard Practice for Fastener Sampling for Specified Mechanical Properties and Performance Inspection

ASTM F 1941M, Electrodeposited Coatings on Threaded Fasteners [Metric]

ASTM F 2329, 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)

4 TERMINOLOGY

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

Continuously Threaded Rod (Threaded Bar): a cylindrical continuously threaded bar with unpointed ends.

5 DIMENSIONS

Dimensions for metric threaded rod are in millimeters and apply before coating, unless otherwise specified. Table 1 contains the thread diameter and pitch dimensions for coarse and fine metric thread sizes considered standard.

6 LENGTH

6.1 Overall Length

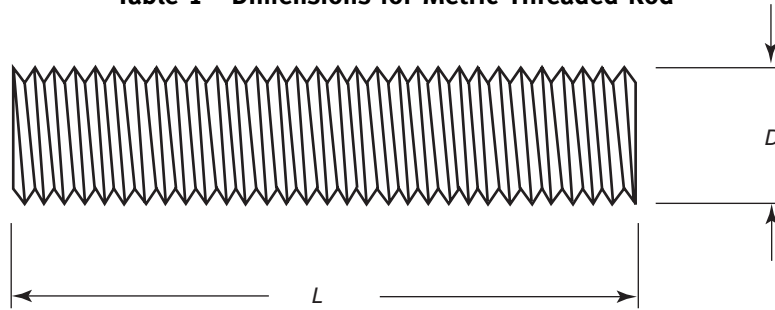
The length of the threaded rod shall be measured, overall, from end to end.

6.2 Length Increments for Metric Threaded Rod

Threaded rod is commonly available in lengths of 1 m, 2 m, and 3 m but can usually be ordered in other lengths. The length tolerance on threaded rods of 2 m and longer shall be ± 10 mm and ± 6 mm for nominal lengths less than 2 m.

7 ENDS

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

Table 1 Dimensions for Metric Threaded Rod

Nominal Diameters, D	Coarse Series Pitch	Fine Series Pitch [Note (1)]	Nominal Diameters, D	Coarse Series Pitch	Fine Series Pitch [Note (1)]
M1.6	0.35	...	M16	2	1.5
M2	0.4	...	M18	2	1.5
M2.5	0.45	...	M20	2.5	1.5
M3	0.5	...	M22	2.5 [Note (2)]	1.5
M3.5	0.6	...	M24	3	2
M4	0.7	...	M27	3	...
M5	0.8	...	M30	3.5	2
M6	1	...	M36	4	2
M8	1.25	1	M42	4.5	...
M10	1.5	0.751 and 1.25	M48	5	...
M12	1.75	1 and 1.25	M56	5.5	...
M14	2	1.5	M64 and larger [Note (3)]	...	...

NOTES:

- (1) Standard fine pitch M profile screw threads of ASME B18.31M are not normally available in threaded rod. Rods with coarse pitch threads are more commonly available than rods with fine pitch threads.
- (2) Very limited use.
- (3) Threaded rod is not normally available in these larger sizes.

8 SCREW THREADS**8.1 Thread Series and Tolerance Class**

Threads shall be metric coarse or fine thread series tolerance class 6g conforming to the dimensions for general purpose external threads in ASME B1.13M unless otherwise specified by the purchaser. Thread size limits prior to plating or coating shall be class 6g (GO and NOT GO). After plating or coating, class 6g threads shall be accepted using the size limits of 6g GO (high limit) and 6g NOT GO (low limit). Threads shall be right-hand unless left hand threads are specifically ordered. (See section 18.)

8.2 Thread 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.

9 STRAIGHTNESS

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

10 MATERIAL 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, including nonmetallic materials, may be specified by the purchaser.

10.1 Steel

Unless otherwise specified, carbon and alloy steel threaded rods shall conform to the alloy and property class requirements in accordance with ASTM F 568M.

10.2 Steel — High Temperature Application

Metric threaded rod per ASTM A 193/A 193M may be specified for applications with high temperature and high strength requirements. Grade B7 is the most readily available.

10.3 Corrosion-Resistant Steel

Unless otherwise specified, corrosion-resistant steel threaded rods shall conform to the alloy and property class requirements in accordance with ASTM F 738M including passivation in accordance with ASTM A 380.

10.4 Nonferrous Materials

Unless otherwise specified, nonferrous, metallic threaded rod materials shall conform to the alloy and property class requirements in accordance with ASTM F 468M.

11 FINISH

Unless otherwise specified, threaded rod shall be supplied with a natural (as processed) finish, unplated or uncoated, in a clean condition. Steel threaded rod shall be coated with a light oil to protect from corrosion during transportation and storage. Applicable electrodeposited coatings shall be identified in accordance with ASTM F 1941M and conform to the requirements therein. Hot-Dip zinc coating shall be in accordance with ASTM F 2329. For other coated products, the purchaser shall specify the coating and thickness.

12 WORKMANSHIP

Threaded rods shall be visually, without magnification, free from burrs, seams, laps, loose scales, irregular surfaces, and any defects affecting their serviceability. When control of surface discontinuities is required, the purchaser shall specify conformance to ASTM F 788/ F 788M for products with nominal diameters of 4 mm and larger and with specified minimum tensile strengths of 800 MPa and greater.

13 ALLOY AND PROPERTY CLASS SYMBOL AND MANUFACTURER'S MARKING

Unless otherwise specified by the purchaser, the marking requirements specified in the material specification are optional for threaded rod at the discretion of the manufacturer. Packaging and label requirements as mandated in applicable material specifications are required.

14 INSPECTION AND QUALITY ASSURANCE

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 B18.18.2 shall apply.

15 COATING THICKNESS CONFORMANCE

Unless otherwise specified by the purchaser, coating thickness and embrittlement testing conformance shall be determined in accordance with the specified coating standard. If the number of samples to be tested is not identified in the coating specification, the number of samples shall be as required by ASTM F 1470.

16 MATERIAL AND MECHANICAL CONFORMANCE

Threaded rods shall comply with the material, mechanical, and test requirements as specified in the material portion of the threaded rod description as designated in the applicable document(s) as identified in section 10. Unless otherwise specified, sampling will be as specified in ASTM F 1470.

17 REPORTING OF INSPECTION RESULTS

The reporting of inspection results shall be agreed upon between the purchaser and supplier in the inquiry, as well as the purchase order, contract, or both.

18 DESIGNATION

Threaded rods shall be designated by data in the following sequences as shown:

- (a) product name (Threaded Rod)
- (b) product standard (ASME B18.31.4M)
- (c) nominal diameter and thread pitch (add "L.H." if left-handed threads are required)
- (d) nominal length (1 m is standard, for lengths other than whole meters, list in millimeters)
- (e) material, including specification and applicable alloy and property class (or grade)
- (f) finish (material, specification, and thickness)

EXAMPLES:

- (1) Threaded Rod per ASME B18.31.4M, M20 × 2.5 × 1 m, carbon steel property class 4.6 per ASTM F 568M, Fe/Zn 5A zinc coating per ASTM F 1941M
- (2) Threaded Rod per ASME B18.31.4M, M10 × 1.5 × 800 mm, corrosion-resisting steel per ASTM F 738M Class A4-70
- (3) Threaded Rod per ASME B18.31.4M, M16 × 2 × 500 mm, ASTM F 468M nickel-copper alloy 400

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

Small Solid Rivets	B18.1.1-1972 (R2006)
Large Rivets	B18.1.2-1972 (R2006)
Metric Small Solid Rivets	B18.1.3M-1983 (R2006)
Square and Hex Bolts and Screws (Inch Series)	B18.2.1-1996 (R2005)
Square and Hex Nuts (Inch Series)	B18.2.2-1987 (R2005)
Metric Hex Cap Screws	B18.2.3.1M-1999 (R2005)
Metric Formed Hex Screws	B18.2.3.2M-2005
Metric Heavy Hex Screws	B18.2.3.3M-1979 (R2001)
Metric Hex Flange Screws	B18.2.3.4M-2001 (R2006)
Metric Hex Bolts	B18.2.3.5M-1979 (R2006)
Metric Heavy Hex Bolts	B18.2.3.6M-1979 (R2006)
Metric Heavy Hex Structural Bolts	B18.2.3.7M-1979 (R2006)
Metric Hex Lag Screws	B18.2.3.8M-1981 (R2005)
Metric Heavy Hex Flange Screws	B18.2.3.9M-2001 (R2006)
Metric Hex Nuts, Style 1	B18.2.4.1M-2002 (R2007)
Metric Hex Nuts, Style 2	B18.2.4.2M-2005
Metric Slotted Hex Nuts	B18.2.4.3M-1979 (R2006)
Metric Hex Flange Nuts	B18.2.4.4M-1982 (R2005)
Metric Hex Jam Nuts	B18.2.4.5M-2008
Metric Heavy Hex Nuts	B18.2.4.6M-1979 (R2003)
Metric Flanged 12-Point Head Screws	B18.2.5M-2009
Fasteners for Use in Structural Applications	B18.2.6-2009
Metric 12-Spline Flange Screws	B18.2.7.1M-2002 (R2007)
Clearance Holes for Bolt, Screws, and Studs	B18.2.8-1999 (R2005)
Straightness Gage and Gaging for Bolts and Screws	B18.2.9-2007
Socket Cap, Shoulder, and Set Screws, Hex and Spline Keys (Inch Series)	B18.3-2003 (R2008)
Socket Head Cap Screws (Metric Series)	B18.3.1M-1986 (R2008)
Metric Series Hexagon Keys and Bits	B18.3.2M-1979 (R2008)
Hexagon Socket Head Shoulder Screws (Metric Series)	B18.3.3M-1986 (R2008)
Hexagon Socket Button Head Cap Screws (Metric Series)	B18.3.4M-1986 (R2008)
Hexagon Socket Flat Countersunk Head Cap Screws (Metric Series)	B18.3.5M-1986 (R2008)
Metric Series Socket Set Screws	B18.3.6M-1986 (R2008)
Round Head Bolts (Inch Series)	B18.5-1990 (R2003)
Metric Round Head Short Square Neck Bolts	B18.5.2.1M-2006
Metric Round Head Square Neck Bolts	B18.5.2.2M-1982 (R2005)
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 (R2005)
Machine Screws and Machine Screw Nuts	B18.6.3-2003 (R2008)
Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws (Inch Series)	B18.6.4-2009
Metric Thread-Forming and Thread-Cutting Tapping Screws	B18.6.5M-2000 (R2005)
Metric Machine Screws	B18.6.7M-1999 (R2005)
General Purpose Semi-Tubular Rivets, Full Tubular Rivets, Split Rivets and Rivet Caps	B18.7-2007
Metric General Purpose Semi-Tubular Rivets	B18.7.1M-2007
Clevis Pins and Cotter Pins (Inch Series)	B18.8.1-1994 (R2000)
Taper Pins, Dowel Pins, Straight Pins, Grooved Pins, and Spring Pins (Inch Series)	B18.8.2-2000
Spring Pins: Coiled Type, Spring Pins: Slotted, Machine Dowel Pins: Hardened Ground, and Grooved Pins (Metric Series)	B18.8.100M-2000 (R2005)
Cotter Pins, Headless Clevis Pins, and Headed Clevis Pins (Metric Series)	B18.8.200M-2000 (R2005)
Plow Bolts	B18.9-2007
Track Bolts and Nuts	B18.10-1982 (R2005)
Miniature Screws	B18.11-1961 (R2005)
Glossary of Terms for Mechanical Fasteners	B18.12-2001 (R2006)
Screw and Washer Assemblies — Sems (Inch Series)	B18.13-1996 (R2008)
Screw and Washer Assemblies: Sems (Metric Series)	B18.13.1M-1998 (R2003)
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
Nylon Insert Locknuts (Inch Series)	B18.16.6-2008
Inspection and Quality Assurance for General Purpose Fasteners	B18.18.1-2007
Inspection and Quality Assurance for High-Volume Machine Assembly Fasteners	B18.18.2-2009
Inspection and Quality Assurance for Special Purpose Fasteners	B18.18.3M-1987 (R2005)
Inspection and Quality Assurance for Fasteners for Highly Specialized Engineered Applications	B18.18.4M-1987 (R2005)
Inspection and Quality Assurance Plan Requiring In-Process Inspection and Controls	B18.18.5M-1998 (R2009)
Quality Assurance Plan for Fasteners Produced in a Third Party Accreditation System	B18.18.6M-1998 (R2009)
Quality Assurance Plan for Fasteners Produced in a Customer Approved Control Plan	B18.18.7M-1998 (R2009)
Lock Washers (Inch Series)	B18.21.1-1999 (R2005)
Lock Washers (Metric Series)	B18.21.2M-1999 (R2005)
Double Coil Helical Spring Lock Washers for Wood Structures	B18.21.3-2008
Metric Plain Washers	B18.22M-1981 (R2005)
Plain Washers	B18.22.1-1965 (R2008)
Part Identifying Number (PIN) Code System for B18 Fastener Products	B18.24-2004
Square and Rectangular Keys and Keyways	B18.25.1M-1996 (R2008)
Woodruff Keys and Keyways	B18.25.2M-1996 (R2008)
Square and Rectangular Keys and Keyways: Width Tolerances and Deviations Greater Than Basic Size	B18.25.3M-1998 (R2008)
Tapered and Reduced Cross Section Retaining Rings (Inch Series)	B18.27-1998 (R2005)
Helical Coil Screw Thread Inserts — Free Running and Screw Locking (Inch Series)	B18.29.1-1993 (R2007)
Helical Coil Screw Thread Inserts: Free Running and Screw Locking (Metric Series)	B18.29.2M-2005
Open-End Blind Rivets With Break Mandrels (Metric Series)	B18.30.1M-2000 (R2005)
Metric Continuous and Double-End Studs	B18.31.1M-2008
Continuous and Double-End Studs	B18.31.2-2008
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