

**ASME B1.1-2019**

[Revision of ASME B1.1-2003 (R2018)]

# **Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms)**

---

**AN AMERICAN NATIONAL STANDARD**



**The American Society of  
Mechanical Engineers**

**ASME B1.1-2019**  
[Revision of ASME B1.1-2003 (R2018)]

# **Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms)**

---

**AN AMERICAN NATIONAL STANDARD**



**The American Society of  
Mechanical Engineers**

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: June 30, 2020

The next edition of this Standard is scheduled for publication in 2024. This Standard will become effective 1 year after the Date of Issuance.

Periodically certain actions of the ASME B1 Committee may be published as Cases. Cases are published on the ASME website under the B1 Committee Page at <http://go.asme.org/B1committee> as they are issued.

Errata to codes and standards may be posted on the ASME website under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The B1 Committee Page can be found at <http://go.asme.org/B1committee>. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting "Errata" in the "Publication Information" section.

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

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

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

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

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

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

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

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

Copyright ©2020 by  
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS  
All Rights Reserved  
Printed in U.S.A.

# CONTENTS

Foreword . . . . .		v
Committee Roster . . . . .		vii
Correspondence With the B1 Committee . . . . .		viii
<b>1</b>	<b>General . . . . .</b>	<b>1</b>
<b>2</b>	<b>Screw Thread Profile . . . . .</b>	<b>3</b>
<b>3</b>	<b>Screw Thread Series . . . . .</b>	<b>5</b>
<b>4</b>	<b>Screw Thread Classes . . . . .</b>	<b>77</b>
<b>5</b>	<b>Screw Thread Allowance and Tolerance . . . . .</b>	<b>77</b>
<b>6</b>	<b>Screw Thread Designation . . . . .</b>	<b>106</b>
<b>7</b>	<b>Dimensional Accommodation of Coating or Plating for 60-Deg Threads . . . . .</b>	<b>110</b>
<b>8</b>	<b>Limits of Size for Standard (UN, UNR, and UNJ) and Special (UNS, UNRS, and UNJS) Series of Threads . . . . .</b>	<b>115</b>
<b>9</b>	<b>Thread Form Tolerances . . . . .</b>	<b>117</b>
<b>10</b>	<b>Formulas and Nomenclature for Thread Form . . . . .</b>	<b>142</b>
<b>11</b>	<b>Tables of Basic Dimensions . . . . .</b>	<b>142</b>
 <b>Nonmandatory Appendices</b>		
A	Terminology and Identification of Unified Inch Screw Threads . . . . .	148
B	Thread Strength Design Formulas . . . . .	150
C	Unified Inch Screw Threads — Metric Translation . . . . .	151
D	Special Threads . . . . .	152
E	Changes to ASME B1.1-1989, Tables 3A and 3B . . . . .	161
F	Special Lengths of Engagement Specifications and Designations . . . . .	180
 <b>Figures</b>		
1	Illustration of Assembly Interference of UNJ-3A Thread and UN-3B Thread in the Maximum Material Condition . . . . .	2
2	Basic Profile for UN and UNR Screw Threads . . . . .	3
3	Basic Profile for UNJ Screw Threads . . . . .	4
4	Root Radius of UNJ External Thread . . . . .	4
5	Disposition of Diametral Tolerances, Allowance, and Crest Clearance for Unified Inch Screw Thread Series UN, Classes 1A, 2A, 1B, and 2B . . . . .	6
6	Disposition of Diametral Tolerances and Crest Clearance for Unified Inch Screw Thread Series UN, Classes 3A and 3B . . . . .	7
7	Disposition of Diametral Tolerances, Allowance, and Crest Clearance for Unified Inch Screw Thread Series UNR, Classes 1A and 2A, and Series UN, Classes 1B and 2B . . . . .	8
8	Disposition of Diametral Tolerances and Crest Clearance for Unified Inch Screw Thread Series UNR, Class 3A and Series UN, Class 3B . . . . .	9
9	External UNJ Thread Design Profile and Tolerances . . . . .	10

10	Disposition of Diametral Tolerances, Allowance, and Crest Clearance for Unified Inch Screw Thread Series UNJ, Classes 2A and 2B . . . . .	11
11	Disposition of Diametral Tolerances and Crest Clearance for Unified Inch Screw Thread Series UNJ, Classes 3A and 3B . . . . .	12
12	Internal UNJ Thread Design Profile and Tolerances . . . . .	78
13	Basic Method of Designating Screw Threads . . . . .	107
14	Ratio of Pitch Diameter Change to Thickness of Coating on 60-deg Threads . . . . .	112
15	Effect of Electrodeposited Coating on 60-deg External Threads . . . . .	113
16	Application of General Thread Symbols . . . . .	143
A-1	Identification of 60-deg Inch Screw Threads Within the Scope of the ASME B1 Committee . . .	148

**Tables**

1	Standard Series Threads (UN, UNR, and UNJ) . . . . .	13
2A	Limits of Size for Standard Series External Threads (UN, UNR, and UNJ) . . . . .	15
2B	Limits of Size for Standard Series Internal Threads (UN and UNJ) . . . . .	45
3	Allowable Variations in Lead and Equivalent Change in Functional Diameter . . . . .	80
4	Increments in Pitch Diameter Tolerance — Class 2A (PD Tolerance = $0.0015 \sqrt[3]{D} + 0.0015\sqrt{LE} + 0.015 \sqrt[3]{p^2}$ ) . . . . .	100
5	Basic Profile and Constants for Calculation Formulas of Thread Dimensions, in. . . . .	102
6	Basic Dimensions for Coarse-Thread Series (UNC, UNRC, and UNJC) . . . . .	118
7	Basic Dimensions for Fine-Thread Series (UNF, UNRF, and UNJF) . . . . .	119
8	Basic Dimensions for Extra-Fine-Thread Series (UNEF, UNREF, and UNJEF) . . . . .	120
9	Basic Dimensions for 4-Thread Series (UN, UNR, and UNJ) . . . . .	121
10	Basic Dimensions for 6-Thread Series (UN, UNR, and UNJ) . . . . .	123
11	Basic Dimensions for 8-Thread Series (UN, UNR, and UNJ) . . . . .	125
12	Basic Dimensions for 12-Thread Series (UN, UNR, and UNJ) . . . . .	127
13	Basic Dimensions for 16-Thread Series (UN, UNR, and UNJ) . . . . .	130
14	Basic Dimensions for 20-Thread Series (UN, UNR, and UNJ) . . . . .	133
15	Basic Dimensions for 28-Thread Series (UN, UNR, and UNJ) . . . . .	135
16	Basic Dimensions for 32-Thread Series (UN, UNR, and UNJ) . . . . .	136
17A	Outline Guide for Determining Limits of Size of External Threads . . . . .	137
17B	Outline Guide for Determining Limits of Size of Internal Threads . . . . .	137
18A	Examples of External Screw Threads . . . . .	138
18B	Examples of Internal Screw Threads . . . . .	140
19	Allowable Variation in 30-deg Basic Half Angle of External and Internal Screw Threads . . . . .	145
20	Nomenclature . . . . .	146
A-1	Identification of 60-deg Inch Screw Threads Within the Scope of the ASME B1 Committee . . .	149
D-1	Limits of Size for Selected Combinations of UNS/UNRS Series Threads . . . . .	153
E-1	Limits of Size for Standard Series Internal and External Threads as Listed in Table 3A of ASME B1.1-1989 . . . . .	162
E-2	Limits as Listed in Table D-1 (Formerly 3B) Prior to ASME B1.1-2003 Edition . . . . .	174

# FOREWORD

ASME B1.1, Unified Inch Screw Threads, is an integrated system of threads for fastening purposes in mechanisms and structures. Its outstanding characteristic is its general interchangeability of threads, achieved through the standardization of thread form, diameter-pitch combinations, and limits of size.

This Standard is the outgrowth of and supersedes previous editions that were published as ASME B1-1924, ASME B1.1-1935, ASME B1.1-1949, ASME B1.1-1960, ASME B1.1-1974, ASME B1.1-1982, ASME B1.1-1989, and ASME B1.1-2003.

The achievements represented by ASME B1.1 in development, standardization, and unification are the result of the cooperation and coordination of many organizations, including The American Society of Mechanical Engineers (ASME), SAE International (formerly Society of Automotive Engineers), National Institute of Science and Technology (formerly National Bureau of Standards), Committee B1, the former National Screw Thread Commission, the former Interdepartmental Screw Thread Committee, British Standards Institution, CSA Group (formerly Canadian Standards Association), and American National Standards Institute (ANSI).

This Standard has its basis in the work done more than a century ago by William Sellers in the United States and Sir Joseph Whitworth in Great Britain. Through the intervening years, there have been many developments and revisions, culminating in the Unified Thread Standard approved and adopted for use by all inch-using countries.

The unification of screw thread standards meets the need for interchangeability among the billions of fasteners made in different countries and used in the complex equipment of modern technology. Unification is equally important for the international trade in mechanisms of all kinds and the servicing of transportation equipment that moves from country to country. Unification is therefore not only highly advantageous but also essential.

Complete unification of certain thread series and six tolerance classes in sizes  $\frac{1}{4}$  in. and larger was achieved with the signing of an accord in Washington, D. C. on November 18, 1948. Since that time, unification has extended to smaller sizes.

Developed by Technical Committee No. 1 of the International Organization for Standardization (ISO), the unified inch standard that was adopted as ISO 5864 is parallel to the ISO metric screw thread system. Both systems have a common basic profile. The standard was subject to Quadripartite Standardization Agreement (QSTAG) 247 in the ABCA Army Standardization Program of America, Britain, Canada, and Australia.

Throughout this history, special attention has been given to the practical aspects of thread standardization, and many details of ASME B1.1 result from studies and tests based on real-world use. For example, users communicated the need for free assembly in high-production industries and the desirability of providing for threads that require a coating. The tolerance classes 2A and 2B were developed to meet these two major requirements as well as to provide a general standard for externally and internally threaded fasteners. Thread symbols and nomenclature are now consistent with ASME B1.7. Thread acceptability now follows ASME B1.3.

In 1992, ASME B1.30 implemented eight-place decimal and rounding rules that are mandatory for all new editions and future revisions of ASME B1 documents. To comply with this decision, the 2003 edition, ASME B1.1-2003

(a) revised some of the values in Table 2 and created [Table E-1](#) of Nonmandatory Appendix E, which identifies and lists the revised dimensions from Table 2 in the ASME B1.1-1989 edition. The majority of the dimensional changes are within  $\pm 0.0001$  in. As stated in [para. 8.2.1](#), the values in this former Table 2, now [Tables 2A](#) and [2B](#), and [Table E-1](#) should be considered acceptable until a future revision of this Standard makes the values in [Tables 2A](#) and [2B](#) the only acceptable values.

(b) moved Table 3B, which provides calculated values for various UNS (unified specials), to Nonmandatory Appendix D. The ASME B1 Committee strongly urges users to adopt the standard thread sizes in [Tables 2A](#) and [2B](#) instead of those listed in [Table D-1](#).

(c) moved Tables 31 through 40, which include some values that differ from those derived by use of the formulas in paras. 5 and 8, to Nonmandatory Appendix D and renamed these Tables D-2 through D-11. (All future special threads should be based on calculations only.)

(d) eliminated all references to thread engagement from this Standard. Past changes in the thread form designation of the "basic" thread height from  $0.7500H$  to  $0.62500H$  confused the calculation of percent of thread engagement.

(e) included the definition of "functional diameter" and added the term to Table 2 in the same column as "pitch diameter," since both characteristics have the same limits of size.

(f) explained in greater depth the effects of coating on threads (see [section 7](#)).

Changes to this 2019 edition include the splitting of ASME B1.1-2003 Table 2, which contained values for both internal and external threads for UN and UNR only, into two tables, [Table 2A](#): Limits of Size for Standard Series External Threads (UN, UNR, and UNJ), and [Table 2B](#): Limits of Size for Standard Series Internal Threads (UN, UNR, and UNJ). The metric translation of this Standard was removed, as were Tables D-2 through D-11 (formerly Tables 31 through 40 in ASME B1.1-1989).

Finally, the UNJ thread profile, formerly defined in ASME B1.15, was added to this Standard. Following the U.S. Department of Defense (DoD) approval of SAE AS8879C-2003, ASME B1 Subcommittee 15 recognized it would become the standard used by the aerospace industry for this thread form. As a result, Subcommittee 15 recommended that the technical information from ASME B1.15 be included in ASME B1.1 for non-aerospace applications.

The UNJ thread form having the enlarged root radius in the external thread was introduced to minimize size and weight in parts for applications requiring high-fatigue strength under high working-stress levels, as in aerospace applications. It is also appropriate for designs in commercial products where stresses are critical. To meet these requirements, the UNJ external thread root radius is designed to be between  $0.15011107P$  and  $0.18042196P$  and the minor diameter of the mating internal thread is increased to ensure the necessary clearance.

This Standard includes Classes 2A and 2B UNJ screw threads. Either Class 2A or Class 3A UNJ threads are appropriate for commercial applications commensurate with the fatigue and stress levels required.

The UNJ thread form is the UN thread form modified to  $0.562500H$ , which allows the  $0.18042196P$  maximum root radius in the external thread. The first known U.S. standard of similar thread form was SAE AS-82, published in March 1942, which describes a modified American National thread form to 75%  $h$  basic thread depth and specifies  $0.10800P$  to  $0.1800P$  root radius in the external thread. This thread was symbolized NR, National Round, and was developed for aircraft engine applications.

Tension fatigue testing of aircraft fasteners in 1942 demonstrated the importance of the external thread root contour in the fatigue life of a screw thread rolled after heat treatment. Fatigue testing isolated the elements of good external thread root design. The root should be radiused, not sharp. Theoretically, it should be a continuous circular arc, blending smoothly with the thread flanks. The radius should be as large as possible within the allowable design form. The root contour should also be smooth throughout and free of any imperfections, tool marks, or other minor notches.

Recognizing the need for improved 160,000 psi tensile strength bolts, the DoD published MIL-B-7838A, the bolt procurement specification for aircraft applications based on the unified thread form of  $0.62500H$ , in April 1952, thus acknowledging a larger external root radius requires a shallower internal thread depth to clear the flank tangency point.

The root radius of the external thread was increased to  $0.15011107P$  minimum and  $0.18042196P$  maximum for the 180,000 psi and higher tensile strength bolts. This external thread form was developed in 1955 by the aerospace fastener industry and was known as the “Hi R” thread form.

Through coordinated effort with the SAE E-25 Engine and Propeller Standard Utility Parts Committee and the Aerospace Industries Association National Aerospace Standards Committee (NASAC), the DoD developed and published in September 1960 the thread specification MIL-S-8879, which features the “Hi R” thread root radius in the external thread and the internal thread modified to  $0.562500H$  basic. In aircraft gas turbine engines, the high-temperature threaded fasteners exhibited better elevated temperature performance using MIL-S-8879 UNJ thread root radius, as the stress-rupture life of bolts was greatly improved.

The UNJ thread form has been adopted by the aerospace industry as the all-purpose thread standard, except for electrical hardware and thread sizes  $0.1380$  and smaller, which may use the UN thread form.

The UNJ profile as defined in this Standard is similar to SAE AS8879C-2003 (superseding MIL-S-8879C) and equivalent to ISO 3161:1977 for thread Classes 3A and 3B. British Standards Institution BS 4084:1978, including Amendment 1, is technically identical to ISO 3161:1977, except for Appendix A, which provides information for a 20-UNJ constant pitch series for diameters through 3 in.

ASME B1.1-2019 was approved by the American National Standards Institute (ANSI) on August 26, 2019.

# ASME B1 COMMITTEE

## Standardization and Unification of Screw Threads

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

### STANDARDS COMMITTEE OFFICERS

**A. L. Barrows**, *Chair*  
**D. S. George**, *Vice Chair*  
**D. Papert**, *Secretary*

### STANDARDS COMMITTEE PERSONNEL

<b>A. L. Barrows</b> , Swanson Tool Manufacturing, Inc.	<b>D. Miskinis</b> , Consultant
<b>K. Bly</b> , Vermont Thread Gage	<b>D. Papert</b> , The American Society of Mechanical Engineers
<b>L. Borowski</b> , Greenslade & Co., Inc.	<b>J. R. Popovic</b> , Cleveland Specialty Inspection Services, Inc.
<b>H. J. Cox</b> , Frank Cox Metrology, Ltd.	<b>M. W. Rose</b> , Glastonbury Southern Gage
<b>G. A. Cuccio</b> , Capitol Manufacturing Co.	<b>P. Larouche</b> , <i>Alternate</i> , Johnson Gage Co.
<b>R. Dodge</b> , Pennoyer Dodge Co.	<b>R. J. Hukari</b> , <i>Contributing Member</i> , SPS Technologies
<b>D. Everett</b> , National Institute of Standards and Technology	<b>R. P. Knittel</b> , <i>Contributing Member</i> , Consultant
<b>J. O. Gehret III</b> , Gehret Gage, LLC	<b>D. R. Oas</b> , <i>Contributing Member</i> , Seaway Bolt & Specials Corp.
<b>D. S. George</b> , Michigan Metal Coating	<b>E. Schwartz</b> , <i>Contributing Member</i> , Consultant
<b>J. R. Gervasi</b> , Kerr Lakeside, Inc.	<b>B. F. Sheffler</b> , <i>Contributing Member</i> , Consultant
<b>P. Holahan</b> , Fastenal Co.	<b>D. Skierski</b> , <i>Contributing Member</i> , Sterling Gage & Calibration, LLC
<b>L. C. Johnson</b> , Johnson Gage Co.	<b>R. D. Strong</b> , <i>Contributing Member</i> , Lear Corp.
<b>D. D. Katz</b> , Precision Fittings	<b>C. J. Wilson</b> , <i>Contributing Member</i> , Consultant
<b>D. R. Maisch</b> , PMC Lone Star	

### SUBCOMMITTEE 1 — UNIFIED SCREW THREADS

<b>A. L. Barrows</b> , <i>Chair</i> , Swanson Tool Manufacturing, Inc.	<b>S. Brahimi</b> , <i>Contributing Member</i> , Industrial Fasteners Institute
<b>D. Miskinis</b> , <i>Vice Chair</i> , Consultant	<b>M. Cox</b> , <i>Contributing Member</i> , Consultant
<b>K. Bly</b> , Vermont Thread Gage	<b>R. J. Hukari</b> , <i>Contributing Member</i> , SPS Technologies
<b>L. Borowski</b> , Greenslade & Co., Inc.	<b>J. C. Jennings</b> , <i>Contributing Member</i> , Naval Surface Warfare Center, Philadelphia Division
<b>R. Dodge</b> , Pennoyer Dodge Co.	<b>X. Li</b> , <i>Contributing Member</i> , China Productivity Center for Machinery Industry
<b>D. S. George</b> , Michigan Metal Coating	<b>E. Schwartz</b> , <i>Contributing Member</i> , Consultant
<b>J. R. Gervasi</b> , Kerr Lakeside, Inc.	<b>B. F. Sheffler</b> , <i>Contributing Member</i> , Consultant
<b>P. Holahan</b> , Fastenal Co.	<b>R. D. Strong</b> , <i>Contributing Member</i> , Lear Corp.
<b>L. C. Johnson</b> , Johnson Gage Co.	<b>C. J. Wilson</b> , <i>Contributing Member</i> , Consultant
<b>P. Larouche</b> , Johnson Gage Co.	
<b>M. Oliver</b> , M. Oliver Consulting	



## CORRESPONDENCE WITH THE B1 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, B1 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.

This Standard is always open for comment, and 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.

**Attending Committee Meetings.** The B1 Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the B1 Standards Committee. Future Committee meeting dates and locations can be found on the Committee Page at <http://go.asme.org/B1committee>.

# UNIFIED INCH SCREW THREADS (UN, UNR, AND UNJ THREAD FORMS)

## 1 GENERAL

### 1.1 Scope

This Standard specifies the thread form, series, class, allowance, tolerance, and designation for unified screw threads. (In order to emphasize that unified screw threads are based on inch modules, they may be denoted unified inch screw threads.) Several variations in thread form have been developed for unified threads; however, this Standard covers only UN, UNR, and UNJ thread forms.

The metric translation of this Standard that was in the 2003 edition has been removed (see [Nonmandatory Appendix C](#)). [Nonmandatory Appendices D](#) through [F](#) contain information that is supplementary to the sections of this Standard.

### 1.2 Unified Screw Thread Standards

The standards for unified screw threads published in this Standard are in agreement with formal standards of the International Organization for Standardization (ISO) for diameter-pitch combinations, designations, and tolerances for 60-deg triangular form inch screw threads. The unified screw thread symbols UN, UNC, UNF, and UNEF were derived by the addition of the letter “U” preceding the thread symbols used for American National screw threads N, NC, NF, and NEF.

Unified screw threads have their origin in an accord signed in Washington, D.C. on November 18, 1948 by representatives of standardizing bodies of Canada, the United Kingdom, and the United States and have subsequently superseded American National screw threads.

### 1.3 Thread Forms

UN applies to both internal and external threads. UNR applies only to external threads; the difference between UN and UNR threads, in addition to designation, is that a flat or rounded root contour due to tool wear is specified for UN threads, while only a defined rounded root contour is specified for UNR threads. Basic thread height is 0.54126588*P*.

The UNJ screw thread is designed for use on highly stressed applications requiring high-fatigue strength. For aerospace applications, only Classes 3A and 3B should be used. Basic thread height is only

0.48713929*P* to permit a root radius larger than that of the UN and UNR forms.

### 1.4 Interchangeability

**1.4.1 UN and UNR.** Unified (UN/UNR) and its predecessor American National (N) screw threads have substantially the same thread form, and threads of both standards having the same diameter and pitch are mechanically interchangeable. The principal differences between these standards relate to the application of allowances, the variation of tolerances with size, differences in the amounts of pitch diameter tolerances for external and internal threads, and differences in thread designations. Unified inch and ISO metric screw threads are not mechanically interchangeable.

**1.4.2 UNJ.** UN and UNJ threads are interchangeable with the exception of UNJ-3A external threads, which at maximum material condition will not assemble with a UN internal thread of any class at maximum material condition (see [Figure 1](#)).

### 1.5 Designations

Unified thread sizes (specific combinations of diameter and pitch shown in [Table 1](#)) are identified by the letter combination “UN” in the thread symbol. In the unified standards, the pitch diameter tolerances for external threads differ from those for internal threads; for this reason the letter “A” is used in the thread symbol to denote an external thread and the letter “B,” an internal thread. Where the letters “U,” “A,” or “B” do not appear in the thread designation, the threads conform to the outdated American National screw threads. Details regarding thread designations are given in [section 6](#).

### 1.6 References

The following is a list of publications referenced in this Standard. Unless otherwise specified, the latest edition shall apply. The following documents form a part of this Standard to the extent specified herein.

ASME B1.2, Gages and Gaging for Unified Inch Screw Threads

ASME B1.3, Screw Thread Gaging Systems for Acceptability: Inch and Metric Screw Threads