NOTICE OF ADOPTION

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20 April 1984

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FOREWORD

(This Foreword is not part of ASME B1.1-1989.)

This Standard is the outgrowth of and supersedes previous editions that were published as B1-1924, B1.1-1935, B1.1-1949, B1.1-1960, B1.1-1974, and B1.1-1982. Throughout such development, special attention has been given to the practical aspects of thread standardization, and many details of the current Standard result from studies and tests based on user problems. For example, there was disclosed the need for free assembly in high-production industries and the desirability of making some provision for threads that require a coating. The tolerance classes 2A/2B were developed to meet these two major requirements as well as to provide a general standard for externally and internally threaded fasteners.

This issue includes: (a) latest symbols in accordance with latest issue on Nomenclature, ANSI/ASME B1.7M; (b) a clearer definition of acceptability criteria as described in ANSI/ASME B1.3M; (c) sketches and drawings altered to meet the latest legibility requirements. The diameter–pitch combinations remain the same as in previous editions.

The Unified Screw Threads Standard is an integrated system of threads for fastening purposes in mechanisms and structures. Its outstanding characteristic is general interchangeability of threads, achieved through the standardization of thread form, diameter–pitch combinations, and limits of size.

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

The achievements represented by ASME B1.1 in development, standardization, and unification are the result of cooperation and coordination of many organizations, including The American Society of Mechanical Engineers, 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, Canadian Standards Association, and American National Standards Institute.

Unification of screw thread standards received its impetus from the need for interchangeability among the billions of fasteners used in the complex equipment of modern technology and made in different countries. Equally important, however, are international trade in mechanisms of all kinds and the servicing of transportation equipment which moves from country to country. These have made unification not only highly advantageous, but practically essential. In sizes $^1/_4$ in. and larger, complete unification of certain thread series and six tolerance classes was signaled by the signing of an accord on November 18, 1948. Since that time, further unification has been extended into smaller sizes. Working through Technical Committee No. 1 of the International Organization for Standardization (ISO), the unified standard was adopted as an ISO inch screw thread standard, ISO 5864, parallel to the ISO metric screw thread system. Both systems have a common basic profile. The standard was subject to Quadripartite Standardization Agree-

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ment (QSTAG) 247, in the ABCA Army Standardization Program of America, Britain, Canada, and Australia.

Suggestions for improvement of this Standard will be welcomed. They should be sent to the American National Standards Institute, 1430 Broadway, New York, New York, 10018.

ASME B1.1-1989 was approved by the American National Standards Institute (ANSI) on August 29, 1989.

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A1 Identification of 60 deg. Inch Screw Threads Within the Scope of ASME Committee B1 138

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UNIFIED INCH SCREW THREADS (UN AND UNR THREAD FORM)

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 and UNR thread forms.

For easy reference, a metric translation of this Standard has been incorporated as Appendix C. Appendices A through C contain useful 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 for diameter–pitch combinations, designations, and tolerances for 60 deg. triangular form inch screw threads. Unified screw threads had 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 UN and UNR Screw Threads

UNR applies only to external threads; the difference between UN and UNR threads, in addition to designation, is that a flat or optional rounded root contour is specified for UN threads, while only a rounded root contour is specified for UNR threads.

1.4 Interchangeability

Unified (UN/UNR) and its predecessor, American National 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.

1.5 Designations

Unified thread sizes (specific combinations of diameter and pitch) 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 Reference Documents

The latest issues of the following documents form a part of this Standard to the extent specified herein.

American National Standards

When the following American National Standards referred to in this Standard are superseded by a revision approved by the American National Standards Institute, Inc., the revision shall apply.

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

ANSI/ASME B1.3M
Screw Thread Gaging Systems for Dimensional Acceptability — Inch and Metric Screw Threads

ANSI/ASME B1.7M
Nomenclature, Definitions, and Letter Symbols for Screw Threads

ANSI B94.11M
Twist Drills

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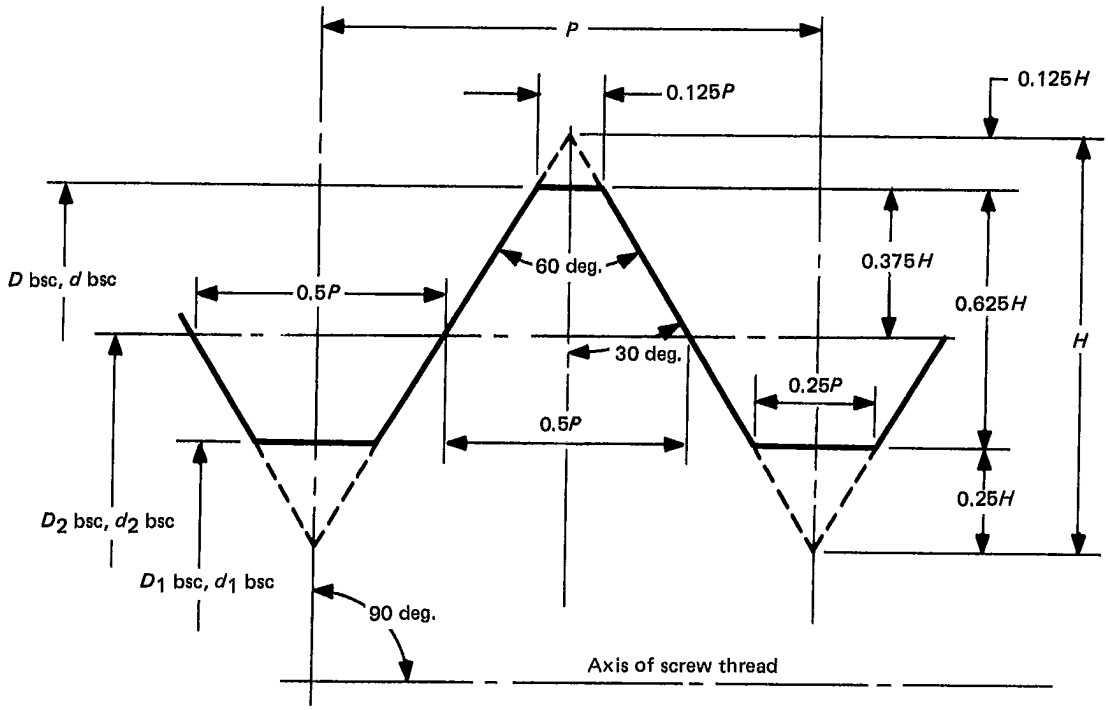


FIG. 1 BASIC PROFILE FOR UN AND UNR SCREW THREADS

International Organization for Standardization
ISO 68
ISO General Purpose Screw Threads—Basic Profile

1.7 Acceptability

Acceptability of product threads shall be in accordance with ANSI/ASME B1.3M. Gages and gaging shall be in accordance with ANSI/ASME B1.2.

1.8 Reference Temperature

The reference temperature is 68°F for dimensions defined by this system.

1.9 Units of Measure

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

1.10 Federal Government Use

When this Standard is approved by the Department of Defense and federal agencies and is incorporated into FED-STD-H28/2, Screw-Thread Standards for Federal Services, Section 2, the use of this Standard by the federal government will be subject to all the requirements and limitations of FED-STD-H28/2.

2 SCREW THREAD PROFILE

2.1 Scope

The basic profile and design profiles are defined in this Section and are the basis of all thread dimensions given in this Standard.

2.2 Basic Profile

The basic profile for UN screw threads is identical to that for UNR screw threads and is shown in Fig. 1. Profile applies to an axial plane.

For reference, the basic profile for UN and UNR screw threads is identical to that for ISO metric screw threads shown in ISO 68.

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2.3 Design Profiles

The design profiles define the maximum-material conditions for external and internal threads with no allowance and are derived from the basic profile. The design profiles of both external and internal screw threads vary from the basic profile.

2.3.1 Design Profiles of External Threads. The design profiles of external UN and UNR screw threads are included in Figs. 2 and 3. A flat root contour is specified for UN threads; however, it is permissible to provide for some threading tool crest wear. Therefore, a rounded root contour cleared beyond the 0.25P flat width of the basic profile is optional. The rounded root also reduces the rate of threading tool crest wear and improves fatigue strength over that of a flat root thread.

(a) The root contour of external UNR screw threads shown in Figs. 2 and 3 shall have a smooth, continuous, nonreversing contour with a radius of curvature not less than 0.108P at any point and shall blend tangentially into the flanks and any straight segment. At the maximum-material condition, the point of tangency shall be at a distance not less than 0.625H below the basic major diameter.

(b) The design profiles of external UN and UNR screw threads have flat crests. However, in practice, product thread crests may be flat, or partially or corner rounded. A rounded crest tangent at a 0.125P flat is shown as an option in Figs. 2 and 3.

2.3.2 Design Profile of Internal Threads. The design profile of the internal UN screw thread is included in Figs. 2 and 3 (*there is no internal UNR screw thread*). In practice it is necessary to provide for some threading tool crest wear; therefore, the root of the design profile is rounded and cleared beyond the 0.125P flat width of the basic profile.

2.4 Formulas and Symbols

The formulas and symbols pertaining to the basic profile and the design profiles are given in Section 10.

3 SCREW THREAD SERIES

3.1 Thread Series Definition

Thread series are groups of diameter–pitch combinations distinguished from each other by the number of threads per inch applied to a series of specific diameters. There are two general series classifications: standard and special.

3.1.1 Standard Series. The standard series consists of three series with graded pitches (coarse, fine, and extra fine) and eight series with constant pitches (4, 6, 8, 12, 16, 20, 28, and 32 threads per inch). The standard series is shown in Table 2. Limits of size are shown in Table 3A. See Section 8 for limits of size.

3.1.2 Special Series. The special series consists of all threads with diameter–pitch combinations that are not included in the standard series. When allowances and tolerances of special series threads are derived from unified formulation as shown in Section 5, the threads are designated UNS or UNRS. Limits of size for selected combinations of UNS/UNRS threads are shown in Table 3B. If allowance and tolerance are not derived from unified formulation, the threads are designated special. See Section 6 for details of designation.

3.2 Order of Selection

Wherever possible, selection should be made from Table 3A, Standard Series—Unified Screw Threads, preference being given to the coarse and fine thread series. If threads in the standard series do not meet the requirements of design, reference should be made to the selected combinations in Table 3B. The third expedient is to design UNS/UNRS threads using tables of allowance and tolerance in Sections 12 and 13. The last resort is to design special threads and use the formulas for limits of size in Section 8.

3.3 Coarse Thread Series Applications

The coarse thread series (UNC/UNRC) is generally used for the bulk production of screws, bolts, and nuts. It is commonly used in relatively low strength materials such as cast iron, aluminum, magnesium, brass, bronze, and plastic, because the coarse series threads provide more resistance to internal thread stripping than the fine or extra-fine series. Coarse series threads are advantageous where rapid assembly or disassembly is required, or if corrosion or damage from nicks due to handling or use is likely.

3.4 Fine Thread Series Applications

The fine thread series (UNF/UNRF) is commonly used for bolts and nuts in high strength applications. This series has less thread depth and a larger minor diameter than coarse series threads. Consequently, thinner walls are permitted for internal threads and

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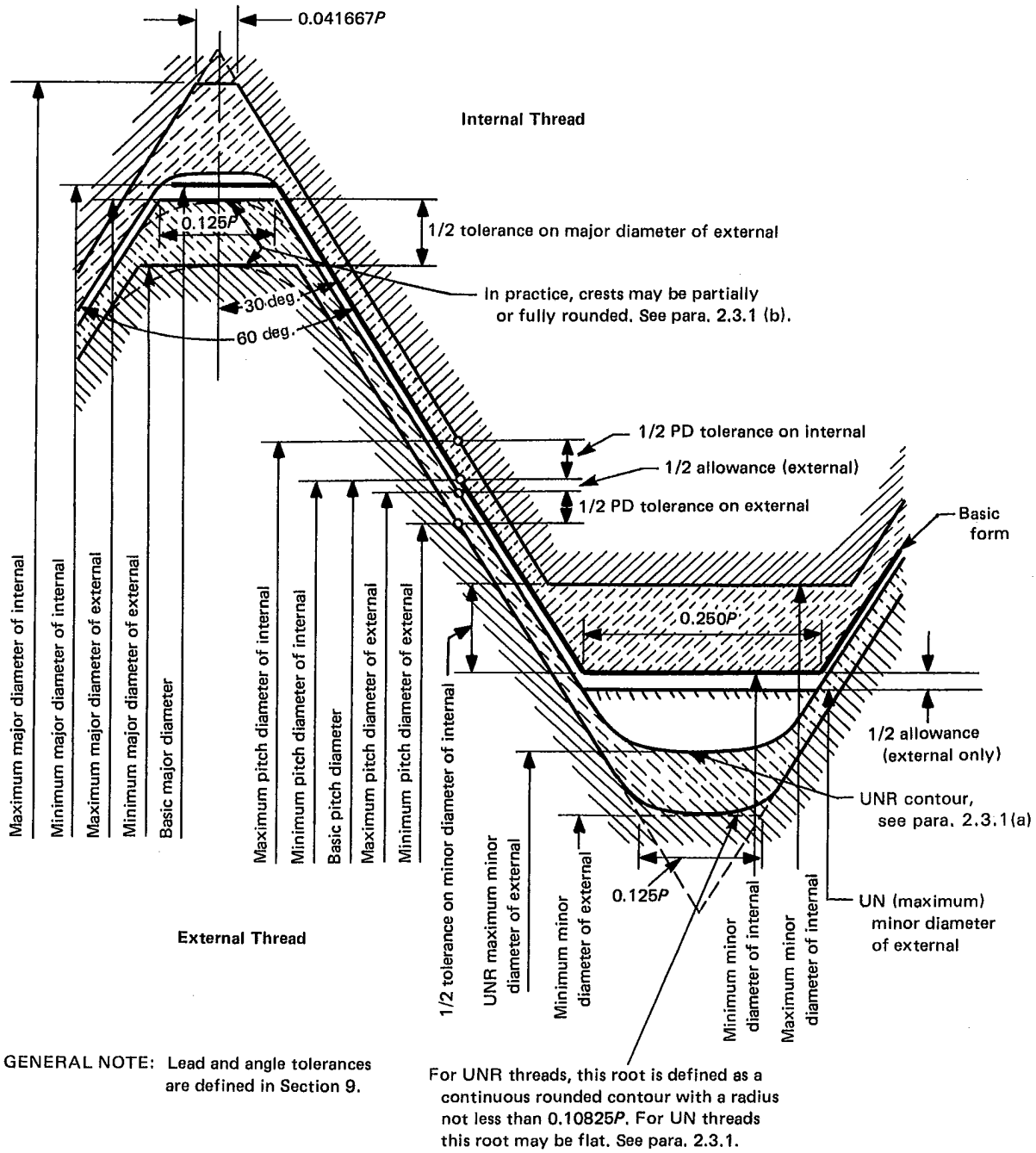
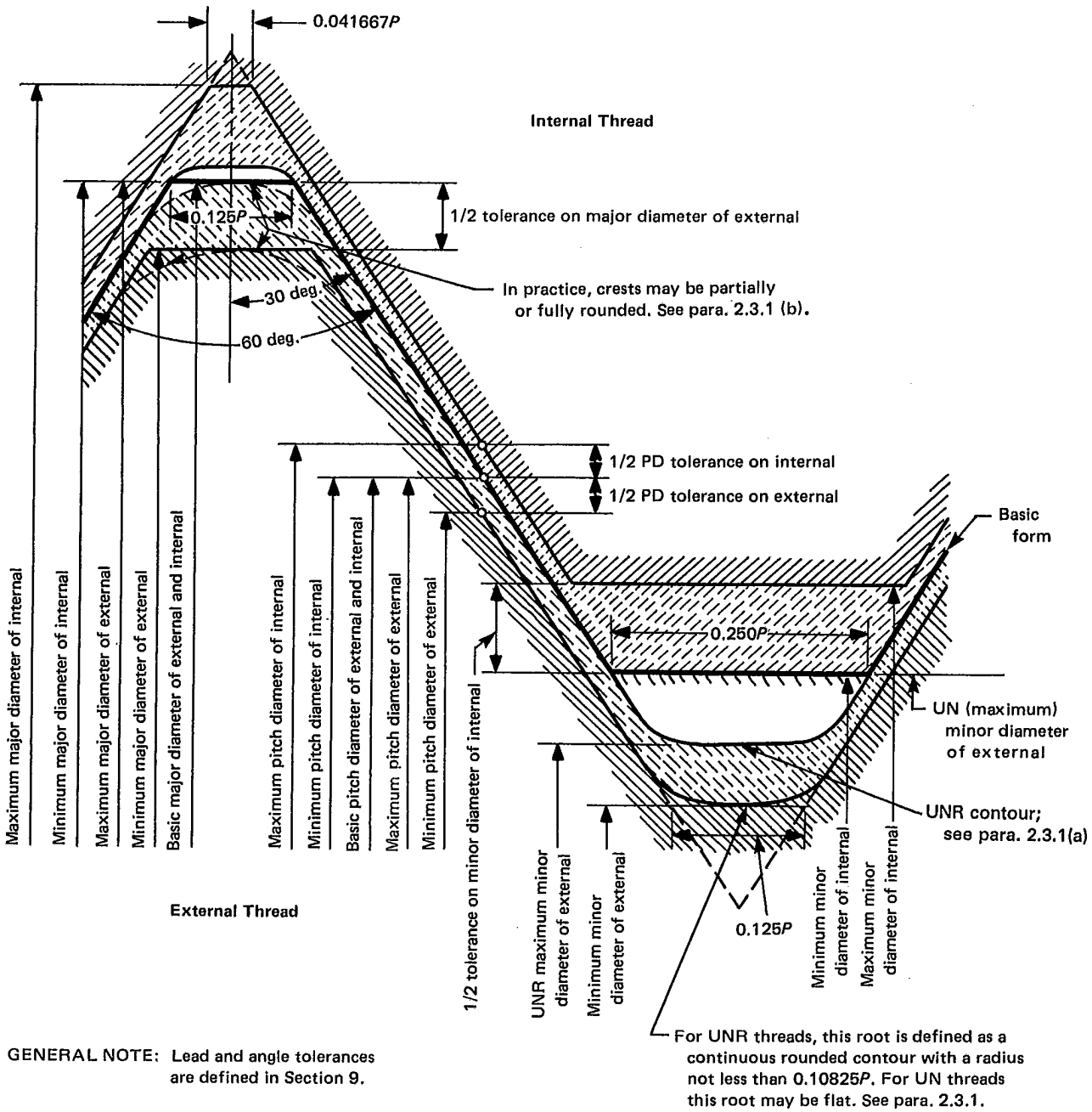


FIG. 2 DISPOSITION OF DIAMETRAL TOLERANCES, ALLOWANCE, AND CREST CLEARANCE FOR UNIFIED INCH SCREW THREAD CLASSES 1A, 2A, 1B, AND 2B

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GENERAL NOTE: Lead and angle tolerances are defined in Section 9.

FIG. 3 DISPOSITION OF DIAMETRAL TOLERANCES AND CREST CLEARANCES FOR UNIFIED INCH SCREW THREAD CLASSES 3A AND 3B

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more strength is available to external threads than for coarse series threads of the same nominal size. In order to prevent internal thread stripping, a longer length of engagement is required for fine series than for coarse series threads for thread materials of the same strength levels. However, for both fine and coarse series threads, length of engagement in tapped holes must be selected to meet strength requirements. Fine series threads have less tendency to loosen under vibration than coarse series threads, because of the smaller lead angle. This also allows for finer adjustment in cases such as a slotted nut and cotter pin assembly.

3.5 Extra-Fine Thread Series Applications

The extra-fine series (UNEF/UNREF) is used particularly for equipment and threaded parts that require fine adjustment, such as bearing retaining nuts, adjusting screws, etc., and for thin-wall tubing and thin nuts.

3.6 Constant-Pitch Thread Series Applications

The various constant-pitch series (UN/UNR) with 4, 6, 8, 12, 16, 20, 28, and 32 threads per inch, given in Table 2, offer a comprehensive range of diameter–pitch combinations for those purposes where the threads in the coarse, fine, and extra-fine series do not meet the particular requirements of the design. The primary sizes of the 8-UN, 12-UN, and 16-UN series shown in Table 2 are the most commonly used.

Whenever a thread in a constant-pitch series also appears in the UNC, UNF, or UNEF series, the symbols and tolerances for limits of size of those standard series are applicable.

3.6.1 8-Thread Series. The 8-thread series (8-UN) is a uniform-pitch series for large diameters or as a compromise between coarse and fine thread series. Although originally intended for high-pressure-joint bolts and nuts, it is now widely used as a substitute for the coarse thread series for diameters larger than 1 in.

3.6.2 12-Thread Series. The 12-thread series (12-UN) is a uniform-pitch series for large diameters requiring threads of medium-fine pitch. Although originally intended for boiler practice, it is now used as a continuation of the fine thread series for diameters larger than 1½ in.

3.6.3 16-Thread Series. The 16-thread series (16-UN) is a uniform-pitch series for large diameters requiring fine-pitch threads. It is suitable for adjusting collars and retaining nuts and also serves as a continuation of the extra-fine thread series for diameters larger than $1\frac{11}{16}$ in.

3.7 Fine Threads for Thin-Wall Tubing

The limits of size for a 27-thread series, ranging from ¼ to 1 in. nominal size, are included in Table 3B. These threads are recommended for general use on thin-wall tubing. The minimum length of complete thread shall be one-third of the basic major diameter plus five threads ($D/3 + 0.185$).

4 SCREW THREAD CLASSES

4.1 Thread Classes

Thread classes are distinguished from each other by the amounts of tolerance and allowance. Classes 1A, 2A, and 3A apply to external threads only, and Classes 1B, 2B, and 3B apply to internal threads only. Allowance is specified only for Classes 1A and 2A and the allowance is identical for both classes. Tolerance decreases as class number increases (e.g., tolerance for Class 3A is less than that for Class 2A, which is less than that for Class 1A).

4.1.1 Class 2A and 2B Threads. Class 2A (external) and Class 2B (internal) threads are the most commonly used thread classes for general applications, including production of bolts, screws, nuts, and similar threaded fasteners.

The maximum diameters of Class 2A uncoated threads are less than basic by the amount of the allowance. The allowance minimizes galling and seizing in high-cycle wrench assembly, or it can be used to accommodate plated finishes or other coating. However, for threads with additive finish, the maximum diameters of Class 2A may be exceeded by the amount of the allowance; i.e., the 2A maximum diameters apply to an unplated part or to a part before plating, whereas the basic diameters (the 2A maximum diameter plus allowance) apply to a part after plating. The minimum diameters of Class 2B threads, whether or not plated or coated, are basic, affording no allowance or clearance in assembly at maximum-material limits.

4.1.2 Class 3A and 3B Threads. Class 3A (external) and Class 3B (internal) threads provide for applications where closeness of fit and/or accuracy of thread elements are important. The maximum diameters of Class 3A threads and the minimum di-

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ameters of Class 3B threads, whether or not plated or coated, are basic, affording no allowance or clearance for assembly at maximum-material limits.

4.1.3 Class 1A and 1B Threads. Class 1A (external) and Class 1B (internal) threads replaced American National Class 1 screw threads. These classes provide for applications where a liberal tolerance and an allowance are required to permit easy assembly even with slightly nicked threads. These classes are intended for ordnance and other special uses. Maximum diameters of Class 1A threads are less than basic by the amount of the allowance (the allowance is identical to that for Class 2A). The allowance is not available for plating or coating and, consequently, in some cases it may be necessary to make special provisions in thread manufacturing for accommodation of plating or coating. The minimum diameters of Class 1B threads, whether or not plated or coated, are basic and consequently afford no allowance or clearance for assembly at maximum-material limits.

4.1.4 Class 2AG Threads. Certain applications require an allowance for rapid assembly to permit application of the proper lubricant or for residual growth due to high-temperature expansion. In these applications, when the thread is coated and the 2A allowance is not permitted to be consumed by such coating, the thread class symbol is qualified by the addition of the letter G (old symbol for allowance) following the class symbol. Refer to paras. 6.2.1, 7.1, and 7.3 for more detailed information.

4.2 Combinations of Classes

The requirements for screw thread fits for specific applications are predicated on end use and can be met by specifying the proper combinations of thread classes for the components. For example, a Class 2A external thread may be used with a Class 1B, 2B, or 3B internal thread.

5 SCREW THREAD ALLOWANCE AND TOLERANCE

5.1 Allowance

Allowance is specified only for Class 1A and 2A external threads. For Class 1A threads, its purpose is to preclude the possibility of surface-to-surface fit between mating parts and it cannot be used to accommodate plating or coating. For Class 2A threads, the allowance may be used to accommodate plating or coating. Allowance for Classes 1A and 2A is identical and is based on Class 2A pitch diameter tolerance for the respective series standard length of engagement and is applicable for all lengths of engagement.

Formulas for allowance are given in para. 5.8.1(a) and values are given in Sections 12 and 13.

Applications of allowances to the basic thread form are shown in Fig. 2.

EXAMPLE: 2.0625-12UNS-2A
From para. 5.8.1(a): Allowance $es = 0.300\ Td_2(2A)$.
From para. 5.2, example (1): $Td_2(2A) = 0.0061$.
Therefore, $es = 0.300 \times 0.0061 = 0.00183$, or 0.0018 in. when rounded.

5.2 Pitch Diameter Tolerance, All Classes

NOTE: Refer to Table 2 for the standard series of diameter–pitch combinations. Allowances and tolerances for standard series threads are applied in Table 3A. All other diameter–pitch combinations are considered nonstandard. Allowances and tolerances for a selection of nonstandard threads are applied in Table 3B.

The pitch diameter tolerances specified in Table 3A for all classes of the UNC and UNF series are based on a length of engagement equal to the basic major (nominal) diameter and are applicable for lengths of engagement from five pitches to up to 1½ diameters. For the 4-UN, 6-UN, and 8-UN series, the pitch diameter tolerances specified for Classes 2A, 2B, 3A, and 3B are based on a length of engagement equal to the basic major (nominal) diameter and are applicable for lengths of engagement up to 1½ diameters.

The pitch diameter tolerances specified in Table 3A for all classes of the UNEF, 12-UN, 16-UN, 20-UN, 28-UN, and 32-UN series are based on a length of engagement of 9 pitches and are applicable for lengths of engagement from 5 to 15 pitches.

The pitch diameter tolerances specified in Table 3B for all classes of the UNS series are based on a length of engagement of 9 pitches and are applicable for lengths of engagement from 5 to 15 pitches.

Formulas for pitch diameter tolerance are given in paras. 5.8.1(c) and 5.8.2(b), and values are given in Sections 12 and 13.

Applications of tolerances to the thread form are shown in Figs. 2 and 3.

For special threads not included in Table 3B, the tolerances and allowances should be obtained from the tabulated tolerances or increments for special threads, if applicable, or computed from the formula values for standard lengths of engagement. For lengths of engagement over 15 to and including 30

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pitches, the pitch diameter tolerances are 1.25 times the formula values; and for lengths of engagement over 30 pitches, the tolerances are 1.50 times the formula values.

EXAMPLES:
(1) 2.0625-12UNS-2A; LE = 1 in. (12 pitches).
Use Table 34 column for major diameter of 1.875 through 2.25. Read pitch diameter tolerance Td_2(2A) in 12 threads per inch row for length of engagement LE equal to 0.42 to 1.25 in. (5 to 15 pitches). Td_2 = 0.0061 in.
(2) 6.500-5UNS-SE2B; LE = 4 in. (20 pitches).
From para. 5.8.2(b): TD_2(2B) = 1.300 Td_2(2A). Use Table 19 for Td_2(2A), since 5 TPI is not tabulated in Table 37.

Increment D (not tabulated) = $0.0015\sqrt[3]{D}$	= 0.002799
Increment LE (9 pitches)	= 0.002012
Increment P	= 0.005130
Td_2(2A) for $LE = 9P$	= 0.009941
TD_2(2B) for $LE = 9P$ = 1.300 Td_2(2A)	= 0.012923
TD_2(2B) for $LE = 20P$ = 1.25 TD_2(2B)	= 0.016154

or 0.0162 in. when rounded.

5.3 Special Lengths of Engagement *LE*

For special applications, the required length of engagement might be the determining factor in the proper selection of thread tolerances. When design considerations require nonstandard pitches or extreme conditions of engagement not covered by the tables, the tolerances may be modified as explained below or calculated using the formulas.

It is particularly important that this increase in tolerance be noted by the user for external threads (Class 3A) callout. At times it is impossible for the producer to know the length of engagement with an internally threaded member. It may be necessary for the producer to lower the maximum values of pitch diameter when making such externally threaded components. Hence the increased tolerance noted.

5.3.1 Long *LE* Using Gage Length *LG* Equal to *LE*

(a) For engagement lengths exceeding 1.5 diameters, for UNC, UNF, 4-UN, 6-UN, and 8-UN series, the pitch diameter tolerances shown in Table 3A should be increased as follows.

(1) For lengths of engagement over 1.5 to and including 3 diameters, the pitch diameter tolerances are 1.25 times the values for the standard lengths of engagement shown in Table 3A.

(2) For lengths of engagement over 3 diameters, the tolerances are 1.50 times the values shown in Table 3A.

EXAMPLE:
0.500-13UNC-SE2B; LE = 1 in. (2 diameters).
From Table 3A or Table 20: TD_2 = 0.0065.
TD_2 for LE of 2 diameters = 1.25 Td_2 standard
= 1.25 × 0.0065
= 0.0081 in.

(b) For engagement lengths exceeding 15 pitches, for UNEF, 12-UN, 16-UN, 20-UN, 28-UN, and 32-UN series, and for UNS threads in Table 3B, the pitch diameter tolerances shown in Tables 3A and 3B, as applicable, should be increased as follows.

(1) For lengths of engagement over 15 to and including 30 pitches, the pitch diameter tolerances are 1.25 times the values for the standard lengths of engagement shown in Tables 3A and 3B, as applicable.

(2) For lengths of engagement over 30 pitches, the tolerances are 1.50 times the values shown in Tables 3A and 3B, as applicable.

EXAMPLE:
1.5000-28UN-SE2A; LE = 2 in. (56 pitches).
From Table 3A or Table 29: Td_2 = 0.0042 for standard length of engagement.
Td_2 for LE = 56 pitches = 1.50 Td_2 standard
= 1.50 × 0.0042
= 0.0063 in.

NOTE: See example in para. 5.3.1(c).

(c) Major Diameter Tolerance and Length of Engagement for External Threads, All Classes. External thread major diameter tolerances are based on pitch only and are applicable for all lengths of engagement, with this exception: where the external thread pitch diameter tolerance for long lengths of engagement exceeds 0.9 times the major diameter tolerance, the latter should be increased to 1.10 times the adjusted pitch diameter tolerance.

Formulas for the major diameter tolerance for external threads are given in para. 5.8.1(b) and values are given in Sections 12 and 13.

EXAMPLE:
1.5000-28UN-SE2A; LE = 2 in. (56 pitches).
From the example in para. 5.3.1(b), Td_2 = 0.0063.
From Table 29, Td = 0.0065, so Td_2 = 0.969 Td. Therefore, Td must be adjusted to 1.10 Td_2.
Adjusted Td = 1.10 × 0.0063 = 0.0069 in.

(d) High Strength Materials Using Standard Pitch Diameter Tolerances. For applications of long length of engagement of mating parts involving very high strength materials, increases in tolerances based on standard length of engagement may be detrimental. In these cases, the tolerances based on the standard

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length of engagement may be applied to increased length of engagement threads. This requires the GO thread gages to have a special length equal to the length of engagement.

(e) Standard Bolt, Added Allowance in Tapped Hole, EI Increases. In some cases where greater than standard length of engagement is required, it is desirable to use standard externally threaded parts with tolerances based on standard length of engagement. For example, in the case of a standard bolt assembled into a tapped hole in aluminum, the designation of the bolt thread will conform to that of a thread for a standard length of engagement.

To assure proper assembly, the tapped hole thread into which the bolt is assembled must not interfere with the bolt thread. This could happen if no special provision were made in the tapped hole thread due to the cumulative effect of lead variation on the bolt thread, inasmuch as the increased length of engagement exceeds the thickness of the GO thread gage used for acceptance of the bolt thread. To avoid this condition, an allowance should be provided in the tapped hole, the amount of which should be the diameter equivalent of the cumulative lead variation for the increased length of engagement, which is one-half the pitch diameter tolerance of the bolt thread allowed for the standard length of engagement. This requires the GO thread and GO plain gages to have a special length equal to the length of engagement.

EXAMPLE:
0.5000-13UNC-SE2B; LE = 1 in. (2 diameters); assembled with standard bolt thread.
Add allowance $EI = {}^1/_2Td_2$ for standard bolt thread. From Table 4, column 5, ${}^1/_2Td_2$ (standard) = 0.0025. Therefore, the thread is redesignated to indicate a nonstandard internal thread with the allowance of 0.0025 added to the basic size of 0.5000. New designation is 0.5025-13UNS-SE2B. Allowance is also added to the standard minor diameter size limits and to the adjusted pitch diameter size limits. See paras. 5.3.1(a) and 6.6.1.

(f) Standard Internal Thread, Added Allowance on External Thread, es Increases. In some cases where greater than standard length of engagement is required, it is desirable to use standard internally threaded parts with tolerances based on standard length of engagement.

The threaded rod onto which a standard clevis yoke is assembled must not interfere with the clevis yoke thread, since standard clevis yokes have extra internal threads. An allowance should be provided on the rod thread, the amount of which should be the diameter equivalent of the cumulative lead variation for the increased length of engagement, which is one-half the pitch diameter tolerance of clevis yoke thread allowed for the standard length of engagement. The major diameter tolerance is not increased. This requires the GO thread and GO plain gages to have a special length equal to the length of engagement.

EXAMPLE:
0.3750-24UNF-SE2A; LE = 0.88 in. (2.35 diameters); assembled with standard internal thread.
Add allowance, equal to ${}^1/_2TD_2$ for standard internal thread. From Table 4, column 8, ${}^1/_2TD_2$ (standard) = 0.00245, which is rounded to 0.0025. Therefore, the thread is redesignated to indicate a nonstandard external thread with the allowance of 0.0025 subtracted from the basic size of 0.3750. New designation is 0.3725-24UNS-SE2A. The added allowance is also subtracted from the standard major diameter size limits and from the adjusted pitch diameter size limits. See paras. 5.3.1(a) and 6.6.1.

5.3.2 Long Length of Engagement Using Standard Thread Gage Limits. ANSI/ASME B1.2 recommends that the length of the GO gage should approximate the length of engagement. However, it is sometimes more economical to accept these threads with GO thread gages made from standard gage blanks which have length approximating the standard lengths of engagement.

NOTE: When this is done, additional precautions are necessary to determine the effect of cumulative variation of lead and straightness of thread axis due to a long length of engagement.

If applicable, an additional allowance should be provided, preferably on the external thread, the amount of which should be the diameter equivalent of the cumulative lead variation for the increased length of engagement, equal to the sum of one-half the pitch diameter tolerances of the external and internal threads allowed for the standard length of engagement.

EXAMPLE:
0.3750-24UNF-2A; LE = 0.88 in. (2.35 diameters); with external and internal thread gages of standard length.
Add allowance equal to ${}^1/_2Td_2 + {}^1/_2TD_2$ for standard mating threads. From Table 4, column 5, ${}^1/_2Td_2$ (standard) = 0.0019.
From Table 4, column 8, ${}^1/_2TD_2$ (standard) = 0.00245.
The sum of these, after rounding, is equal to 0.0044, which is the added allowance. Therefore, the thread is redesignated to indicate a nonstandard external thread, with the allowance of 0.0044 subtracted from the basic size of 0.3750. New designation is 0.3706-24UNS-2A. The added allowance is also subtracted from the standard major diameter and pitch diameter size limits. See para. 6.6.2.

5.4 Minor Diameter Tolerance and Allowance for External Threads

The tolerance for minor diameter is for reference only. In dimensioning external threads, the minimum minor diameter is not specified, being established by the crest of an unworn tool. In practice, the minor diameter of an external thread is satisfactory when

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accepted by a gage or gaging method that represents the maximum-material condition of the internal thread less the allowance *es*, if any. A formula for the minor diameter tolerance of external threads is given in para. 5.8.1(d).

5.5 Major Diameter Tolerance for Internal Threads

The tolerance for major diameter is for reference only. In dimensioning internal threads, the maximum major diameter is not specified, being established by the crest of an unworn tool. In practice, the major diameter of an internal thread is satisfactory when accepted by a gage or gaging method that represents the maximum-material condition of an external thread which has no allowance. A formula for the major diameter tolerance of internal threads is given in para. 5.8.2(a).

5.6 Minor Diameter Tolerance and Length of Engagement for Internal Threads

Formulas for the minor diameter tolerance for internal threads are given in para. 5.8.2(c) and values are given in Sections 12 and 13.

Internal thread minor diameter tolerances are suitable for lengths of engagement up to 1.5 diameters. For applications having shorter or longer lengths of engagement, it may be advantageous to decrease or increase the tolerance as explained below.

5.6.1 The principal practical factors which govern minor diameter tolerance are ease of tapping, standard drill sizes, and height of engagement.

NOTE: Height of engagement is measured in a radial direction, while length of engagement is measured in an axial direction.

Height of engagement correlates with the stripping strength of the thread assembly and, therefore, also with the length of engagement. It also correlates with the tendency toward disengagement of the threads on one side when assembly is eccentric. The amount of possible eccentricity is one-half of the sum of the allowance and pitch diameter tolerances on both mating threads. For a given pitch, or height of thread, this sum increases with the diameter, and accordingly, this factor would require a decrease in minor diameter tolerance with an increase in thread diameter. However, such a decrease in tolerance often is not feasible without requiring special drill sizes; therefore, to be able to use as many as possible of the available standard drill sizes listed in ANSI B94.11M, the minor diameter tolerance for Classes 1B and 2B of a given pitch for ¼ in. diameter and larger is constant.

There may be applications where the lengths of engagement of the mating threads or the combination of materials used for mating threads are such that the maximum tolerance may not provide the desired strength of the fastening. Experience has shown that for lengths of engagement less than 0.67*D* (the minimum thickness of standard nuts), the minor diameter tolerance may be reduced without causing tapping difficulties.

In other applications, the length of engagement of mating threads may be long because of design considerations or the combination of materials used for mating threads. As the threads engaged increase in number, their height of engagement may be shallower and still develop stripping strength greater than the external thread breaking strength. In these cases, the maximum tolerance should be increased to reduce the possibility of tapping difficulties.

It is particularly important to reduce the number of minor diameter tolerances to a practical minimum. This reduction is usually obvious to the producer of longer internally threaded components, but sometimes is not understood by the user. Tolerances for all recommended diameters, lengths of engagement, and selected pitches are given in Table 39 for Classes 1B and 2B, and in Table 40 for Class 3B.

In these Tables, the tolerances for lengths of engagement less than 0.33*D* are 0.50 times the formula values. For lengths of engagement from 0.33*D* to 0.67*D*, the tolerances are 0.75 times the formula values; for lengths of engagement from 0.67*D* to 1.5*D*, the tolerances are equal to the formula values; and for lengths of engagement over 1.5*D*, the tolerances are 1.25 times the formula values. Where the tolerance value so computed is more than 0.394*P*, which corresponds to a resulting minimum thread height of 53%, the value is adjusted to equal 0.394*P*.

5.7 Disposition of Allowance and Tolerance

The disposition of allowance, tolerance, and crest clearances for the various thread classes is shown in Figs. 2 and 3.

5.8 Formulas for Allowance and Tolerance

The following formulas for allowance and tolerance are used for unified formulation and apply to standard and special series screw threads.

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The following symbols are used in the equations.

D = basic major (nominal) diameter
LE = length of engagement, in.
P = pitch, in. = $1/n$
H = height of fundamental triangle = $0.866025P$
n = threads per inch

5.8.1 External Thread

(a) Allowance (External Threads)

(1) Classes 1A and 2A = 0.300 Class 2A pitch diameter tolerance

(2) Class 3A = no allowance

(b) Major Diameter Tolerance (External Threads)

(1) Class 1A = $0.090\sqrt[3]{P^2}$

(2) Classes 2A and 3A = $0.060\sqrt[3]{P^2}$

The tolerance for Class 2A coarse and the 8-thread series threads of unfinished, hot-rolled material is $0.090\sqrt[3]{P^2}$. This does not apply to standard fasteners with rolled threads.

(c) Pitch Diameter Tolerance (External Threads)

(1) Class 1A = 1.500 Class 2A pitch diameter tolerance

(2) Class 2A[1] = $0.0015\sqrt[3]{D} + 0.0015\sqrt{LE} + 0.015\sqrt[3]{P^2}$

(3) Class 3A = 0.750 Class 2A pitch diameter tolerance

(d) Minor Diameter Tolerance (External Threads)

(1) UNR Classes. To intersection of rounded root with its centerline (see Figs. 2 and 3), equals pitch diameter tolerance for class of thread specified, plus $H/8$ (see Table 6).

(2) UN Classes 1A, 2A, and 3A. To intersection of flat root with flanks of threads (see Figs. 2 and 3), equals pitch diameter tolerance for class of thread specified, plus $H/4$ (see Table 6).

5.8.2 Internal Thread

(a) Major Diameter Tolerance (Internal Threads). For Classes 1B, 2B, and 3B, equals $H/6$ plus the pitch diameter tolerance of the class of thread under consideration.

(b) Pitch Diameter Tolerance (Internal Threads)

(1) Class 1B = 1.950 Class 2A pitch diameter tolerance (1.5 Class 2B)

(2) Class 2B = 1.300 Class 2A pitch diameter tolerance

(3) Class 3B = 0.975 Class 2A pitch diameter tolerance (0.750 Class 2B)

(c) Minor Diameter Tolerance (Internal Threads)

(1) Classes 1B and 2B. For all thread series and special threads in sizes less than ¼ in., equals $[0.05\sqrt[3]{P^2} + 0.03P/D] - 0.002$ in., within the following limitations.

(a) Tolerances shall not be greater than $0.394P$. (This corresponds to 53% of the thread[2] and applies in the range of the smallest number sizes of the UNC and UNF thread series.)

(b) Tolerances shall not be less than $0.25P - 0.4P^2$. (This corresponds to a thread[2] of 65% for 80 to 24 threads per inch.)

The formulas are suitable for general applications having lengths of engagement up to 1.5 diameters.

For all thread series and special threads ¼ in. and larger, 80 to 4 threads per inch, inclusive, equals $0.25P - 0.4P^2$. (This corresponds to a thread[2] of 64.5% for 80 threads per inch graduating to 71.8% for 4 threads per inch.) For all thread series and special threads ¼ in. and larger with less than 4 threads per inch, equals $0.15P$.

(2) Class 3B. For all thread series, equals $[0.05\sqrt[3]{P^2} + 0.03P/D] - 0.002$ in., within the following limitations.

(a) Tolerance shall not be greater than $0.394P$. (This corresponds to 53% of the thread[2] and applies in the range of the smallest numbered sizes of the UNC and UNF thread series.)

(b) Tolerance shall not be less than:

(1) for 80 to 13 threads per inch, inclusive, $0.23P - 1.5P^2$. (This corresponds to a thread[2] of 67% for 80 threads per inch, graduating to 74% for 13 threads per inch.)

(2) for 12 threads per inch and coarser, $0.120P$. (This corresponds to a thread[2] of 74% and is the tolerance for all sizes 12 threads and coarser and 1 in. and larger.)

The formulas are suitable for general applications having lengths of engagement up to 1.5 diameters.

5.9 Circular Runout

Circular runout is the full indicator movement (see ANSI Y14.5M).

5.9.1 Internal Thread. When measurement is specified, the runout of the minor diameter cylinder with the pitch diameter cylinder on the internal thread shall not exceed its pitch diameter tolerance.

[1]See Table 19 for values of these terms corresponding to given values of diameter, length of engagement, and pitch.

[2]The percent of thread is based on the "old symmetrical" thread height of $0.64952P$. See Table 6, column 13.

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5.9.2 External Thread. When measurement is specified, the runout of the major diameter cylinder with the pitch diameter cylinder on the external thread shall not exceed its pitch diameter tolerance.

5.10 Lead and Flank Angle Tolerances

See Section 9.

5.11 Coated or Plated Threads

See Section 7 for dimensional accommodation and limits for coated threads.

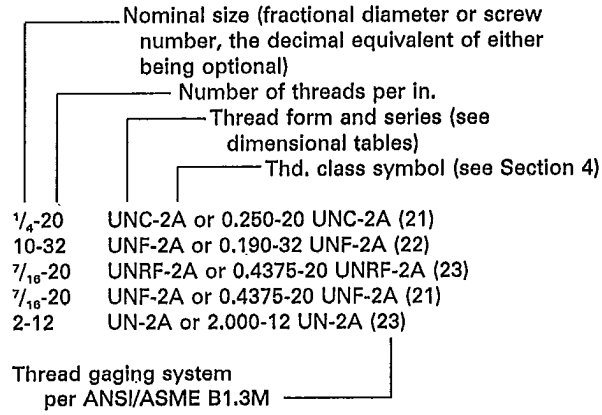
6 SCREW THREAD DESIGNATION

6.1 Basic Method of Designating

The basic method of designating a screw thread is used where the standard tolerances or limits of size based on the standard length of engagement are applicable, as indicated in Section 5.

The designation specifies in sequence the nominal size, number of threads per inch, thread series symbol, thread class symbol, and gaging system per ANSI/ASME B1.3M (see Fig. 4). The nominal size is the basic major diameter and is specified as the fractional diameter, screw number, or their decimal equivalent. Where decimal equivalents are used for size callout, they shall be shown in four place decimals (omitting the cipher in the fourth place) for fractional sizes, and in three place decimals for number sizes. They shall be interpreted as being nominal size designations only and shall have no dimensional significance beyond the fractional size or number designation. The thread series symbol indicates the thread form (refer to Section 2), series, and tolerance formulation (refer to Section 3). The thread series symbols for the UN thread form are UNC, UNF, UNEF, or UN for only those sizes of the various series shown in Table 2 and UNS for any other intermediate and larger size diameter–pitch combination having tolerances to unified formulation. The corresponding thread series symbols for the UNR thread form are UNRC, UNRF, UNREF, or UNR. The symbol UNRS corresponds to UNS. The thread class symbols are 1A, 1B, 2A, 2B, 3A, or 3B, where the suffixes A and B relate to external and internal threads, respectively.

UNS threads and threads having special length of engagement require certain additional information as shown in paras. 6.4 and 6.6.



GENERAL NOTE:
Thread acceptability gaging system requirement of ANSI/ASME B1.3M may be added to the thread size designation as noted above or as specified in pertinent documentation, such as drawing or procurement document.

FIG. 4 SCREW THREAD DESIGNATIONS

6.2 Method of Designating Coated Threads

Specification on drawings of the before and after coating dimensions for screw threads is sometimes dictated by an engineering or production consideration that the size before and after coating be controlled. This results from coated screw threads having two stages of design — the before coating stage and the after coating stage. The threaded product may be produced by a supplier and coated by a user. In this case, it is necessary that a clear understanding of the coating requirements and the allowance for coating buildup be agreed upon by both supplier and user (see Section 7).

The before coating (plating) dimensions have a definite bearing on the strength of the screw threads. The before coating stage is, therefore, decidedly an engineering consideration; it is also a production consideration in requiring that proper allowance be made for the specified coating thickness. The finished parts should be of a size after coating that will allow them to be assembled with their coating components as intended.

Recommended methods for designating coated thread under various conditions are described in the following paragraph.

6.2.1 For coated (or plated) Class 2A external threads, the basic (max.) major and basic (max.) pitch diameters shall be given, followed by the words

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AFTER COATING. The major and pitch diameter limits of size before coating shall also be given, followed by the words BEFORE COATING.

EXAMPLE:
$^3/_4$-10 UNC-2A (21)
Major diam. 0.7500 max. } AFTER
PD 0.6850 max.[3] } COATING

Major diam. 0.7482–0.7353 } BEFORE
PD 0.6832–0.6773[4] } COATING

Certain applications require an allowance for rapid assembly to permit application of the proper lubricant or for residual growth due to high-temperature expansion. In these applications, when the thread is coated and 2A allowance is not permitted to be consumed by such coating, the thread class symbol is qualified by the addition of the letter G (old symbol for allowance) following the class symbol; the maximum major and maximum pitch diameters are reduced below basic size by the amount of the 2A allowance and followed by the words AFTER COATING, thereby insuring that the allowance is maintained. The thread before coating must have special provisions to allow for coating thickness. The major and pitch diameter limits of size before coating (calculated in accordance with Section 7) shall also be given, followed by the letters SPL (special) and by the words BEFORE COATING.

EXAMPLE:
$^3/_4$-10 UNC-2AG (22)
Major diam. 0.7482 max. } AFTER
PD 0.6832 max.[4] } COATING

Major diam. 0.7464–0.7335 SPL } BEFORE
PD 0.6814–0.6755 SPL[5] } COATING

Threads accepted to Class 2A limits before coating are accepted after coating by basic size Class 3A GO thread gages. The allowance given in the dimensional tables for Class 2A thread is sufficient to allow for a limited amount of coating as described in Section 7. However, if a greater coating thickness is required, it will be necessary to calculate the before coating limits in accordance with Section 7.

6.2.2 For coated (or plated) Class 3A external threads, the maximum major and maximum pitch diameters may optionally be given, followed by the words AFTER COATING, thereby indicating that the thread before coating must have special provisions to allow for coating thickness. The major and pitch diameter limits of size before coating (calculated in accordance with para. 7.5) shall be given, followed by the letters SPL (special) and by the words BEFORE COATING.

EXAMPLE: Thickness of coating 0.0002 in. to 0.0003 in.
$^1/_4$-28 UNF-3A (21)
Major diam. 0.2500 max. } AFTER COATING
PD 0.2268 max.[6] } (Optional)

Major diam. 0.2494–0.2431 SPL } BEFORE
PD 0.2256–0.2235 SPL } COATING

6.2.3 For coated (or plated) Class 1A external threads, the maximum major and maximum pitch diameters may optionally be given, followed by the words AFTER COATING, thereby indicating that the thread before coating must have special provisions to allow for coating thickness. The major and pitch diameter limits of size before coating (calculated in accordance with para. 7.5) shall be given, followed by the letters SPL (special) and by the words BEFORE COATING.

EXAMPLE: Thickness of coating 0.0002 in. to 0.0003 in.
$^1/_4$-20 UNC-1A (21)
Major diam. 0.2489 max. } AFTER COATING
PD 0.2164 max.[7] } (Optional)

Major diam. 0.2483–0.2363 SPL } BEFORE
PD 0.2152–0.2100 SPL[8] } COATING

6.2.4 Where an allowance is required to accommodate coating (or plating) on Class 1B, 2B, or 3B internal threads, the minimum minor and minimum pitch diameters may optionally be given, followed by the words AFTER COATING. The minor and pitch diameter limits of size before coating (calculated in accordance with para. 7.6) shall be given, followed by the letters SPL (special) and by the words BEFORE COATING.

EXAMPLES: Thickness of coating 0.0002 in. to 0.0003 in.
$^1/_4$-20 UNC-1B (21)
Minor diam. 0.196 min. } AFTER COATING
PD 0.2175 min. } (Optional)

Minor diam. 0.197–0.207 SPL } BEFORE
PD 0.2187–0.2256 SPL } COATING

[3]Major and PD values are equal to basic and correspond to those in Table 3A for Class 3A.

[4]Major and PD limits are those in Table 3A for Class 2A.

[5]Major and PD limits correspond to those in Table 3A for Class 2A minus the coating allowance.

[6]Major and PD limits are those in Table 3A for Class 3A.

[7]Major and PD limits are those in Table 3A for Class 1A.

[8]Major and PD limits correspond to those in Table 3A for Class 1A minus the coating allowance.

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$^{3}/_{4}$-10 UNC-2B (22)
Minor diam. 0.642 min. } AFTER COATING
PD 0.6850 min. } (Optional)

Minor diam. 0.643–0.663 SPL } BEFORE
PD 0.6862–0.6935 SPL } COATING

$^{1}/_{4}$-28 UNF-3B (23)
Minor diam. 0.2110 min. } AFTER COATING
PD 0.2268 min. } (Optional)

Minor diam. 0.2116–0.2194 SPL } BEFORE
PD 0.2280–0.2308 SPL } COATING

NOTE: The after coating limits for all of the examples above are the minor and PD values in Table 3A for the respective class of thread.

6.3 Method of Designating Left-Hand Threads

Unless otherwise specified, threads are right hand; a left-hand thread shall be designated LH as follows.

EXAMPLE:
$^{1}/_{4}$-20 UNC-3A-LH (21)

6.4 Method of Designating UNS Threads

UNS threads are special combinations of diameter and pitch with tolerance to unified formulation.

UNS threads have the basic form of designation set out above, supplemented always by the limits of size.

EXAMPLES:
$^{1}/_{4}$-24 UNS-3A (21)
Major diam. 0.2500–0.2428
PD 0.2229–0.2201
Minor diam. 0.205 max.

0.495-20 UNS-3A (21)
Major diam. 0.4950–0.4869
PD 0.4625–0.4593
Minor diam. 0.441 max.

1.200-10 UNS-2B (21)
Minor diam. 1.092–1.113
PD 1.1350–1.1432
Major diam. 1.200 min.

6.5 Designations for Other Threads

Threads having tolerances that do not conform to unified formulation and threads having multiple start or lead, or special form, also require additional considerations in the thread designation. The recommended methods of designating these threads are described in the following paragraphs.

6.5.1 Method of Designating Threads Having Tolerances Not to Unified Formulation. If a standard series thread is altered in any respect other than revised pitch diameter limits for a special length of engagement, the modification of crests, or the adjustment of the limits of size to accommodate coating, as shown above, it is designated in accordance with the following.

EXAMPLES:
$^{7}/_{16}$-24 Unified Form SPL-EXT[9] (22)
Major diam. 0.4340–0.4280 SPL
PD 0.4065–0.4025 SPL
Minor diam. 0.3889 max.
LE 0.38

$^{1}/_{2}$-13 Unified Form SPL-INT[9] (22)
Minor diam. 0.424–0.434 SPL
PD 0.4500–0.4580 SPL
Major diam. 0.5000 min.
LE 0.50

6.5.2 Method of Designating Multiple Start Threads. If a thread is required with a multiple start or lead, it is designated by specifying in sequence the nominal size, pitch (in decimals or threads per inch), and lead (in decimals or fractions) as follows.

EXAMPLE:
$^{3}/_{4}$-0.0625*P*-0.1875*L* Unified Form SPL-EXT[9] (23)
Major diam. 0.7485–0.7391
PD 0.7079–0.7003 SPL
Minor diam. 0.6808 max.
LE 0.75

6.5.3 Method of Designating Special Form Threads. If a thread for design consideration requires a variation from unified standard thread contour and is not covered by another recognized standard, such as when the detail of the root differs from that for the standard thread form, the designation shall not include either the letters "UN" or the word "UNIFIED," but shall be as follows.

EXAMPLE:
$^{7}/_{8}$-18 SPL 60 deg. Form-EXT[9] (22)
Major diam. 0.8750–0.8668
PD 0.8384–0.8343
Minor diam. 0.8068 max.
LE 0.69

[9]Where the thread designation is used in text or is shown on a drawing and a leader line does not indicate the specific position, then add EXT or INT to the designation.

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6.6 Method of Designating Threads Having Special Length of Engagement

In the assembly of threads in mating parts, the length of engagement varies according to the design requirements. It should be noted that the length of engagement is not necessarily the same as the full thread length provided on the part, but is the length of assembled thread in the mating parts.

Where a standard series thread has a special length of engagement differing from that for which the standard pitch diameter tolerances are applicable as indicated in Section 5, the thread class symbol is qualified by the addition of the letters SE (special engagement) preceding the class symbol. The specification of the special pitch diameter limits of size and the length of engagement *LE*, rounded to a two place decimal, are a requirement.

EXAMPLES:
1/2-13 UNC-SE2A (23)
PD 0.4485–0.4423
LE 1.00

1/4-24 UNS-SE3A (23)
Major diam. 0.2500–0.2428
PD 0.2229–0.2194
LE 0.88

6.6.1 In some cases where greater than standard length of engagement is required, it is desirable to use standard externally threaded parts with tolerances based on standard length of engagement. For example, in the case of a standard bolt assembled into a tapped hole in aluminum, the designation of the bolt thread will conform to that of a thread for a standard length of engagement.

The designation for the tapped hole thread should include the allowance in the basic size, the pitch diameter limits of size, and the length of gage, in addition to the information normally given. See para. 5.3.1(e).

EXAMPLE: Requiring use of 1.00 long GO thread and GO plain gages
0.5025-13 UNS-SE2B (21)
Minor diam. 0.420–0.437
PD 0.4525–0.4606
LG 1.00

Similarly, where greater than standard length of engagement is required, it is desirable to use standard internally threaded parts with tolerances based on standard length of engagement. Therefore, the external thread is provided with an added allowance. See para. 5.3.1(f).

The designation for the external thread should include the added allowance in the basic size, the pitch diameter limits of size, and the length of gage, in addition to the information normally given.

EXAMPLE: Requiring use of 0.88 long GO thread and GO plain gages
0.3725-24 UNS-SE2A (21)
Major diam. 0.3714–0.3642
PD 0.3443–0.3396
LG 0.88

6.6.2 When a long length of engagement is required and standard length GO thread and GO plain gages are to be used, the thread designation should indicate the thread modifications and a standard gage length, *LG* Std. (see para. 5.3.2).

EXAMPLES: With additional allowance indicating use of standard length GO thread and GO plain gages
0.5058-13 UNS-2B (22)
Minor diam. 0.423–0.440
PD 0.4558–0.4623
LG Std.

0.3706-24 UNS-2A (22)
Major diam. 0.3695–0.3623
PD 0.3424–0.3386
LG Std.

6.6.3 For applications of long length of engagement of mating parts involving very high strength materials, increases in tolerances based on standard length of engagement may be detrimental. In these cases, the tolerances based on the standard length of engagement may be applied to increased length of engagement threads. This requires the GO thread gages to have a special length equal to the length of engagement as specified.

The designations for restricted applications should be qualified with the abbreviation SPL (special) as shown in the examples below. See para. 5.3.1(d).

EXAMPLES: Requiring use of 1.00 long GO thread and GO plain gages
0.500-20 UNF-3A SPL (21)
LG 1.00 SPL

0.500-20 UNF-3B SPL (21)
LG 1.00 SPL

NOTE: In drawings, tolerances tabulated for the standard length of engagement in ASME B1.1 shall apply over the full length of engagement.

6.7 Method of Designating Threads Having Modified Crests

It is occasionally necessary to modify the limits of size of the major diameter of an external thread or the minor diameter of an internal thread within the maximum-material limits established for standard series and special threads in order to fit a specific pur-

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pose, but without change in class of thread or pitch diameter limits. (It should be noted that standard pitch diameter gages may be used to accept such threads.) Such threads shall be specified with the established thread designation, followed by a statement of the modified diameter limits and the designation MOD. This practice also applies to modifications of internal thread minor diameters described in para. 5.6.1.

EXAMPLES:
$^{3}/_{8}$-24 UNF-3A MOD (21)
Major diam. 0.3720–0.3648 MOD

$1^{1}/_{2}$-10 UNS-3B MOD (21)
Minor diam. 1.398–1.409 MOD
PD 1.4350–1.4412
Major diam. 1.500 min.

7 DIMENSIONAL ACCOMMODATION OF COATING OR PLATING FOR 60 DEG. THREADS

7.1 Introduction

It is not within the scope of this Standard to make recommendations for thickness of, or to specify limits for, coatings. However, it will aid mechanical interchangeability if certain principles are followed wherever conditions permit. The following guides should be helpful in determining the amount and direction of the alterations to establish applicable limits of size before coating. Some commonly used and firmly established processes for heavy coatings, such as hot dip galvanizing, do not fall within the scope of this Section.

NOTE: The term *coating* refers to one or more applications of additive material to threads, including dry film lubricants, but excluding soft or liquid lubricants that are readily displaced in assembly and gaging. Plating is therefore included as coating in the text.

This Standard specifies limits of size that pertain whether threads are coated or uncoated. Only in Class 2A threads is the allowance available to accommodate coatings. Thus, in all classes of internal threads and in all Class 1A, 2AG, and 3A external threads, limits of size must be adjusted before plating to provide suitable provision for the desired coating.

7.2 Material Limits for Coated Threads

Unless otherwise specified, size limits for standard external thread Class 2A apply prior to coating. The external thread allowance may thus be used to accommodate the coating thickness on coated parts, provided that the maximum coating thickness is no more than one-fourth of the allowance (see Fig. 5). Thus, the thread after coating is subject to acceptance using a basic Class 3A size GO thread gage and a Class 2A thread gage for either minimum material or NOT GO. Where external thread has no allowance, or allowance must be maintained after coating, and for standard internal threads, sufficient allowance must be provided prior to coating to assure that finished product threads do not exceed the maximum-material limits specified. For thread Class 3A, Class 2A allowances in accordance with Tables 20 to 30 or Table 32 should be applied whenever possible (see paras. 7.4, 7.5, and 7.6).

7.3 Dimensional Effects of Coating

On a cylindrical surface, the effect of coating is to change the diameter by twice the coating thickness, one coating thickness on each side of the cylinder. Because the coating thickness is measured perpendicular to the coated surface, while the pitch diameter is measured perpendicular to the thread axis, the effect of a uniformly coated thread flank on the pitch diameter is a change of four times the thickness of coating on the flank (see Fig. 5). The diameters of external threads before coating will be smaller, while the diameters of internal threads before coating will be larger, than the coated diameters.

7.4 External Thread With Allowance Available for Coating

7.4.1 Maximum and Minimum Coating Thickness Specified. The amount of the allowance on the pitch diameter is sufficient for uniform coating if four times the maximum coating thickness is equal to or less than the allowance tabulated in Tables 3A, 3B, 20 to 30, or 32.

7.4.2 Only Nominal or Minimum Coating Thickness Specified. If no coating thickness tolerance is given, it is recommended that a tolerance of plus 50% of the nominal or minimum thickness be assumed. Then the amount of the allowance on the pitch diameter is sufficient for uniform coating if six times the specified coating thickness is equal to or less than the allowance tabulated in Tables 3A, 3B, 20 to 30, or 32.

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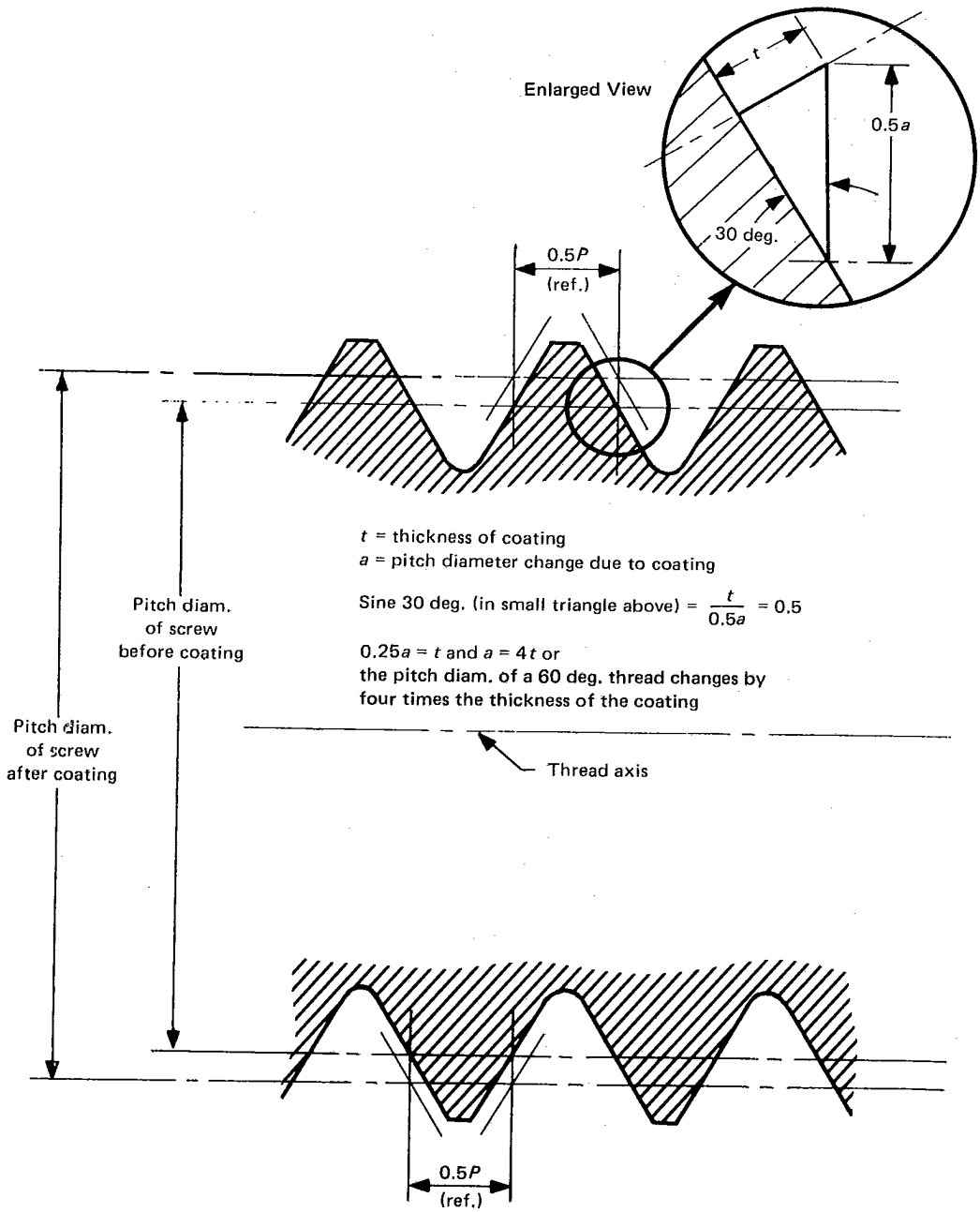


FIG. 5 RATIO OF PITCH DIAMETER CHANGE TO THICKNESS OF COATING ON 60 DEG. THREADS

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7.5 External Thread With No Allowance for Coating

7.5.1 Maximum and Minimum Coating Thickness Specified. To determine before coating gaging limits for a uniformly coated thread, decrease:

(a) the maximum pitch diameter by four times the maximum coating thickness;

(b) the minimum pitch diameter by four times the minimum coating thickness;

(c) the maximum major diameter by two times the maximum coating thickness;

(d) the minimum major diameter by two times the minimum coating thickness.

EXAMPLE:
⅜-16 UNC-2A (21) AFTER COATING
Coating thickness 0.0002–0.0003 in.

To determine the before coating maximum-material sizes, decrease the maximum pitch diameter of 0.3331 in. by 0.0012 in. (4 × 0.0003) to 0.3319 in., and the maximum major diameter of 0.3737 in. by 0.0006 in. (2 × 0.0003) to 0.3731 in. For the before coating minimum sizes, decrease the minimum pitch diameter of 0.3287 in. by 0.0008 in. (4 × 0.0002) to 0.3279 in., and the minimum major diameter of 0.3643 in. by 0.0004 in. (2 × 0.0002) to 0.3639 in. The before coating sizes should be included in the thread designation (see para. 6.2.1).

7.5.2 Only Nominal or Minimum Coating Thickness Specified. If no coating thickness tolerance is given, it is recommended that a tolerance of plus 50% of the nominal or minimum thickness be assumed. Then, to determine before coating gaging limits for a uniformly coated thread, decrease:

(a) the maximum pitch diameter by six times the coating thickness;

(b) the minimum pitch diameter by four times the coating thickness;

(c) the maximum major diameter by three times the coating thickness;

(d) the minimum major diameter by two times the coating thickness.

EXAMPLE:
½-13 UNC-3A (22)
Coating thickness 0.0004 in.

Since the allowance for Class 2A thread is 0.0015 in., the nominal or minimum coating thickness that may be applied is equal to 0.0015 in. divided by six, or 0.00025 in. (the maximum thickness of coating that may be applied is equal to 0.0015 divided by four or 0.00038 in.). This is not sufficient for the required nominal or minimum coating of 0.0004 in. specified, so additional adjustments to the before coating pitch and major diameters must be made.

To determine the before coating maximum-material sizes, decrease the maximum pitch diameter of 0.4500 in. by 0.0024 in. (6 × 0.0004) to 0.4476 in., and the maximum major diameter of 0.5000 in. by 0.0012 in. (3 × 0.0004) to 0.4988 in. For the before coating minimum sizes, decrease the minimum pitch diameter of 0.4463 in. by 0.0016 in. (4 × 0.0004) to 0.4447 in., and the minimum major diameter of 0.4891 in. by 0.0008 in. (2 × 0.0004) to 0.4883 in. The before coating sizes should be included in the thread designation (see para. 6.2.1).

7.5.3 Adjusted Size Limits. It should be noted in the preceding examples that the before coating material limit tolerances are less than the tolerances after coating. This is because the coating tolerance consumes some of the product tolerance. In some instances, there may be insufficient pitch diameter tolerance available in the before coating condition, so that additional adjustments and controls will be necessary.

7.5.4 Strength. On small thread sizes (0.190 in. and smaller), there is a possibility that coating thickness adjustments will cause base material (minimum) conditions that may significantly affect the strength of externally threaded parts. Limitations on coating thickness, or part redesign, may be necessary.

7.6 Internal Threads

Standard internal threads provide no allowance for coating thickness. To determine before coating gaging limits for a uniformly coated thread, increase:

(a) the minimum pitch diameter by four times the maximum coating thickness, if specified, or by six times the minimum or nominal coating thickness, if not specified;

(b) the maximum pitch diameter by four times the minimum or nominal coating thickness;

(c) the minimum minor diameter by two times the maximum coating thickness, if specified, or by three times the minimum or nominal coating thickness, if not specified;

(d) the maximum minor diameter by two times the minimum or nominal coating thickness.

7.7 Other Considerations

It is essential to adequately review all possibilities and consider limitations in the threading and coating production processes before finalizing the coating

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process and the allowance required to accommodate the coating. A no allowance thread after coating shall not transgress the basic profile, and is therefore subject to acceptance using a basic Class 3A, 1B, 2B, or 3B size GO thread gage.

8 STANDARD SERIES THREADS (UN/UNR) AND LIMITS OF SIZE FOR STANDARD SERIES AND UNS/UNRS SERIES THREADS

8.1 Standard Series

The standard series for unified inch screw threads is listed in Table 2. Although the designations shown are for the UN thread form, UNR designations may be used in all cases.

8.2 Limits of Size

The limits of size are defined by the design profile at its maximum-material condition and the minimum profile at the minimum-material condition. The limits are specified as diameters (major diameter, minor diameter, pitch diameter), and the practical interpretation of these limits on a three-dimensional threaded product depends on the method of inspection. These dimensions serve as a basis for measurement and gaging of the thread, but the methods, techniques, and equipment used for thread evaluation establish the degree of thread conformance to the tabulated dimensions. Current techniques for measuring and gaging do not verify exact conformance of a thread to its specified maximum and minimum envelope. See ANSI/ASME B1.3M for gaging systems for dimensional acceptability.

8.2.1 Limits of size for the majority of the standard series are shown in Table 3A. Omissions are the secondary size range in the 4-UN series, all sizes over 6 in. in the 6-UN series, and all sizes over 6 in. in the 8-UN series. Refer to Table 2 for a list of secondary sizes.

8.2.2 The limits of size for selected combinations of diameter and pitch with tolerances and allowances to unified formulation (designated UNS) are shown in Table 3B.

8.2.3 Limits of size not given may be calculated from the formulas given in the following paragraphs. Formulas and symbols for thread form are given in Section 10.

8.3 Formulas for Limits of Size

These formulas were used to calculate the values shown in Tables 3A and 3B for standard series and selected combinations, respectively. The following symbols are used in the equations.

D bsc = basic major (nominal) diameter
h_s = height of external thread (see Table 6)
h_n = height of internal thread (see Table 6)
h_{as} = screw addendum height (see Table 6)
$h_b = 2h_{as}$ (see Table 6)
D_2 bsc = basic pitch diameter ($D - h_b$) (see Tables 8 through 18)
d_3 = UNR series design minor diameter [$d_1 - (H/8)$] (see Tables 8 through 18)
D_1 bsc = basic minor diameter ($D - 2h_n$) (see Tables 8 through 18)
P = pitch, in.

To obtain limits of size using the formulas, see Table 6 for basic thread form data, Section 11 for basic dimensions, Sections 12 and 13 for allowances and tolerances, or Section 5 for formulas of allowance and tolerance. For easy reference, outline guides for determining limits of size of external and internal threads are given in Tables 1A and 1B.

Section 8 continues on page 53.

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TABLE 1A OUTLINE GUIDE FOR DETERMINING LIMITS OF SIZE OF EXTERNAL THREADS

Thread Class	Major Diameter d		Pitch Diameter d_2		Minor Diameter d_1
	Maximum	Minimum	Maximum	Minimum	
1A	Nominal size minus allowance	Maximum, minus tolerance	Maximum major diameter minus h_b (Table 6, col. 13)	Maximum, minus tolerance	See paras. 8.3.1(e) and (f). Established by crest of new tool and minimum minor diameter of GO thread gage.
2A	Nominal size minus allowance	Maximum, minus tolerance	Maximum major diameter minus h_b (Table 6, col. 13)	Maximum, minus tolerance	See paras. 8.3.1(e) and (f). Established by crest of new tool and minimum minor diameter of GO thread gage.
3A	Nominal size	Maximum, minus tolerance	Maximum major diameter minus h_b (Table 6, col. 13)	Maximum, minus tolerance	See paras. 8.3.1(e) and (f). Established by crest of new tool and minimum minor diameter of GO thread gage.

TABLE 1B OUTLINE GUIDE FOR DETERMINING LIMITS OF SIZE OF INTERNAL THREADS

Thread Class	Minor Diameter D_1		Pitch Diameter D_2		Major Diameter D
	Minimum	Maximum	Minimum	Maximum	
1B	Nominal size minus $2h_n$ (Table 6, col. 15)	Minimum, plus tolerance	Nominal size minus h_b (Table 6, col. 13)	Minimum, plus tolerance	See paras. 8.3.2(a) and (b). Established by crest of new tool and maximum major diameter of GO thread gage.
2B	Nominal size minus $2h_n$ (Table 6, col. 15)	Minimum, plus tolerance	Nominal size minus h_b (Table 6, col. 13)	Minimum, plus tolerance	See paras. 8.3.2(a) and (b). Established by crest of new tool and maximum major diameter of GO thread gage.
3B	Nominal size minus $2h_n$ (Table 6, col. 15)	Minimum, plus tolerance	Nominal size minus h_b (Table 6, col. 13)	Minimum, plus tolerance	See paras. 8.3.2(a) and (b). Established by crest of new tool and maximum major diameter of GO thread gage.

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TABLE 2 STANDARD SERIES THREADS (UN/UNR)

Nominal Size			Threads/in.											
			Series With Graded Pitches			Series With Constant Pitches								
Primary	Secondary	Basic Major Diameter	Coarse UNC	Fine UNF	Extra-Fine UNEF	4-UN	6-UN	8-UN	12-UN	16-UN	20-UN	28-UN	32-UN	Nominal Size
0	...	0.0600	...	80	...	...	...	...	...	...	...	...	...	0
...	1	0.0730	64	72	...	...	...	...	...	...	...	...	...	1
2	...	0.0860	56	64	...	...	...	...	...	...	...	...	...	2
...	3	0.0990	48	56	...	...	...	...	...	...	...	...	...	3
4	...	0.1120	40	48	...	...	...	...	...	...	...	...	...	4
5	...	0.1250	40	44	...	...	...	...	...	...	...	...	...	5
6	...	0.1380	32	40	...	...	...	...	...	...	...	...	UNC	6
8	...	0.1640	32	36	...	...	...	...	...	...	...	...	UNC	8
10	...	0.1900	24	32	...	...	...	...	...	...	...	...	UNF	10
...	12	0.2160	24	28	32	...	...	...	...	...	...	UNF	UNEF	12
1/4	...	0.2500	20	28	32	...	...	...	...	...	UNC	UNF	UNEF	1/4
5/16	...	0.3125	18	24	32	...	...	...	...	...	20	28	UNEF	5/16
3/8	...	0.3750	16	24	32	...	...	...	...	UNC	20	28	UNEF	3/8
7/16	...	0.4375	14	20	28	...	...	...	...	16	UNF	UNEF	32	7/16
1/2	...	0.5000	13	20	28	...	...	...	...	16	UNF	UNEF	32	1/2
9/16	...	0.5625	12	18	24	...	...	...	UNC	16	20	28	32	9/16
5/8	...	0.6250	11	18	24	...	...	...	12	16	20	28	32	5/8
...	11/16	0.6875	...	...	24	...	...	...	12	16	20	28	32	11/16
3/4	...	0.7500	10	16	20	...	...	...	12	UNF	UNEF	28	32	3/4
...	13/16	0.8125	...	...	20	...	...	...	12	16	UNEF	28	32	13/16
7/8	...	0.8750	9	14	20	...	...	...	12	16	UNEF	28	32	7/8
...	15/16	0.9375	...	...	20	...	...	...	12	16	UNEF	28	32	15/16
1	...	1.0000	8	12	20	...	...	UNC	UNF	16	UNEF	28	32	1
...	1 1/16	1.0625	...	...	18	...	...	8	12	16	20	28	...	1 1/16
1 1/8	...	1.1250	7	12	18	...	...	8	UNF	16	20	28	...	1 1/8
...	1 3/16	1.1875	...	...	18	...	...	8	12	16	20	28	...	1 3/16
1 1/4	...	1.2500	7	12	18	...	...	8	UNF	16	20	28	...	1 1/4
...	1 5/16	1.3125	...	...	18	...	...	8	12	16	20	28	...	1 5/16
1 3/8	...	1.3750	6	12	18	...	UNC	8	UNF	16	20	28	...	1 3/8
...	1 7/16	1.4375	...	...	18	...	6	8	12	16	20	28	...	1 7/16
1 1/2	...	1.5000	6	12	18	...	UNC	8	UNF	16	20	28	...	1 1/2
...	1 9/16	1.5625	...	...	18	...	6	8	12	16	20	...	...	1 9/16
1 5/8	...	1.6250	...	...	18	...	6	8	12	16	20	...	...	1 5/8
...	1 11/16	1.6875	...	...	18	...	6	8	12	16	20	...	...	1 11/16
1 3/4	...	1.7500	5	...	...	...	6	8	12	16	20	...	...	1 3/4
...	1 13/16	1.8125	...	...	...	...	6	8	12	16	20	...	...	1 13/16
1 7/8	...	1.8750	...	...	...	...	6	8	12	16	20	...	...	1 7/8
...	1 15/16	1.9375	...	...	...	...	6	8	12	16	20	...	...	1 15/16
2	...	2.0000	4 1/2	...	...	...	6	8	12	16	20	...	...	2
...	2 1/8	2.1250	...	...	...	...	6	8	12	16	20	...	...	2 1/8
2 1/4	...	2.2500	4 1/2	...	...	...	6	8	12	16	20	...	...	2 1/4
...	2 3/8	2.3750	...	...	...	...	6	8	12	16	20	...	...	2 3/8
2 1/2	...	2.5000	4	...	...	UNC	6	8	12	16	20	...	...	2 1/2
...	2 5/8	2.6250	...	...	...	4	6	8	12	16	20	...	...	2 5/8
2 3/4	...	2.7500	4	...	...	UNC	6	8	12	16	20	...	...	2 3/4
...	2 7/8	2.8750	...	...	...	4	6	8	12	16	20	...	...	2 7/8

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TABLE 2 STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size		Basic Major Diameter	Threads/in.											Nominal Size
			Series With Graded Pitches			Series With Constant Pitches								
Primary	Secondary		Coarse UNC	Fine UNF	Extra-Fine UNEF	4-UN	6-UN	8-UN	12-UN	16-UN	20-UN	28-UN	32-UN	
3	...	3.0000	4	...	...	UNC	6	8	12	16	20	...	...	3
...	3⅛	3.1250	...	...	...	4	6	8	12	16	...	...	...	3⅛
3¼	...	3.2500	4	...	...	UNC	6	8	12	16	...	...	...	3¼
...	3⅜	3.3750	...	...	...	4	6	8	12	16	...	...	...	3⅜
3½	...	3.5000	4	...	...	UNC	6	8	12	16	...	...	...	3½
...	3⅝	3.6250	...	...	...	4	6	8	12	16	...	...	...	3⅝
3¾	...	3.7500	4	...	...	UNC	6	8	12	16	...	...	...	3¾
...	3⅞	3.8750	...	...	...	4	6	8	12	16	...	...	...	3⅞
4	...	4.0000	4	...	...	UNC	6	8	12	16	...	...	...	4
...	4⅛	4.1250	...	...	...	4	6	8	12	16	...	...	...	4⅛
4¼	...	4.2500	...	...	...	4	6	8	12	16	...	...	...	4¼
...	4⅜	4.3750	...	...	...	4	6	8	12	16	...	...	...	4⅜
4½	...	4.5000	...	...	...	4	6	8	12	16	...	...	...	4½
...	4⅝	4.6250	...	...	...	4	6	8	12	16	...	...	...	4⅝
4¾	...	4.7500	...	...	...	4	6	8	12	16	...	...	...	4¾
...	4⅞	4.8750	...	...	...	4	6	8	12	16	...	...	...	4⅞
5	...	5.0000	...	...	...	4	6	8	12	16	...	...	...	5
...	5⅛	5.1250	...	...	...	4	6	8	12	16	...	...	...	5⅛
5¼	...	5.2500	...	...	...	4	6	8	12	16	...	...	...	5¼
...	5⅜	5.3750	...	...	...	4	6	8	12	16	...	...	...	5⅜
5½	...	5.5000	...	...	...	4	6	8	12	16	...	...	...	5½
...	5⅝	5.6250	...	...	...	4	6	8	12	16	...	...	...	5⅝
5¾	...	5.7500	...	...	...	4	6	8	12	16	...	...	...	5¾
...	5⅞	5.8750	...	...	...	4	6	8	12	16	...	...	...	5⅞
6	...	6.0000	...	...	...	4	6	8	12	16	...	...	...	6

GENERAL NOTE:
Series designation shown indicates the UN thread form; however, the UNR thread form may be specified by substituting UNR in place of UN in all designations for external use only.

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allow-ance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Toler-ance		Class	Min.	Max.	Min.	Max.	Toler-ance	Min.
0-80 or 0.060-80	UNF	2A	0.0005	0.0595	0.0563	...	0.0514	0.0496	0.0018	0.0446	2B	0.0465	0.0514	0.0519	0.0542	0.0023	0.0600
		3A	0.0000	0.0600	0.0568	...	0.0519	0.0506	0.0013	0.0451	3B	0.0465	0.0514	0.0519	0.0536	0.0017	0.0600
1-64 or 0.073-64	UNC	2A	0.0006	0.0724	0.0686	...	0.0623	0.0603	0.0020	0.0538	2B	0.0561	0.0623	0.0629	0.0655	0.0026	0.0730
		3A	0.0000	0.0730	0.0692	...	0.0629	0.0614	0.0015	0.0544	3B	0.0561	0.0623	0.0629	0.0648	0.0019	0.0730
1-72 or 0.073-72	UNF	2A	0.0006	0.0724	0.0689	...	0.0634	0.0615	0.0019	0.0559	2B	0.0580	0.0635	0.0640	0.0665	0.0025	0.0730
		3A	0.0000	0.0730	0.0695	...	0.0640	0.0626	0.0014	0.0565	3B	0.0580	0.0635	0.0640	0.0659	0.0019	0.0730
2-56 or 0.086-56	UNC	2A	0.0006	0.0854	0.0813	...	0.0738	0.0717	0.0021	0.0642	2B	0.0667	0.0737	0.0744	0.0772	0.0028	0.0860
		3A	0.0000	0.0860	0.0819	...	0.0744	0.0728	0.0016	0.0648	3B	0.0667	0.0737	0.0744	0.0765	0.0021	0.0860
2-64 or 0.086-64	UNF	2A	0.0006	0.0854	0.0816	...	0.0753	0.0733	0.0020	0.0668	2B	0.0691	0.0753	0.0759	0.0786	0.0027	0.0860
		3A	0.0000	0.0860	0.0822	...	0.0759	0.0744	0.0015	0.0674	3B	0.0691	0.0753	0.0759	0.0779	0.0020	0.0860
3-48 or 0.099-48	UNC	2A	0.0007	0.0983	0.0938	...	0.0848	0.0825	0.0023	0.0734	2B	0.0764	0.0845	0.0855	0.0885	0.0030	0.0990
		3A	0.0000	0.0990	0.0945	...	0.0855	0.0838	0.0017	0.0741	3B	0.0764	0.0845	0.0855	0.0877	0.0022	0.0990
3-56 or 0.099-56	UNF	2A	0.0007	0.0983	0.0942	...	0.0867	0.0845	0.0022	0.0771	2B	0.0797	0.0865	0.0874	0.0902	0.0028	0.0990
		3A	0.0000	0.0990	0.0949	...	0.0874	0.0858	0.0016	0.0778	3B	0.0797	0.0865	0.0874	0.0895	0.0021	0.0990
4-40 or 0.112-40	UNC	2A	0.0008	0.1112	0.1061	...	0.0950	0.0925	0.0025	0.0814	2B	0.0849	0.0939	0.0958	0.0991	0.0033	0.1120
		3A	0.0000	0.1120	0.1069	...	0.0958	0.0939	0.0019	0.0822	3B	0.0849	0.0939	0.0958	0.0982	0.0024	0.1120
4-48 or 0.112-48	UNF	2A	0.0007	0.1113	0.1068	...	0.0978	0.0954	0.0024	0.0864	2B	0.0894	0.0968	0.0985	0.1016	0.0031	0.1120
		3A	0.0000	0.1120	0.1075	...	0.0985	0.0967	0.0018	0.0871	3B	0.0894	0.0968	0.0985	0.1008	0.0023	0.1120
5-40 or 0.125-40	UNC	2A	0.0008	0.1242	0.1191	...	0.1080	0.1054	0.0026	0.0944	2B	0.0979	0.1062	0.1088	0.1121	0.0033	0.1250
		3A	0.0000	0.1250	0.1199	...	0.1088	0.1069	0.0019	0.0952	3B	0.0979	0.1062	0.1088	0.1113	0.0025	0.1250
5-44 or 0.125-44	UNF	2A	0.0007	0.1243	0.1195	...	0.1095	0.1070	0.0025	0.0972	2B	0.1004	0.1079	0.1102	0.1134	0.0032	0.1250
		3A	0.0000	0.1250	0.1202	...	0.1102	0.1083	0.0019	0.0979	3B	0.1004	0.1079	0.1102	0.1126	0.0024	0.1250
6-32 or 0.138-32	UNC	2A	0.0008	0.1372	0.1312	...	0.1169	0.1141	0.0028	0.1000	2B	0.104	0.114	0.1177	0.1214	0.0037	0.1380
		3A	0.0000	0.1380	0.1320	...	0.1177	0.1156	0.0021	0.1008	3B	0.1040	0.1140	0.1177	0.1204	0.0027	0.1380
6-40 or 0.138-40	UNF	2A	0.0008	0.1372	0.1321	...	0.1210	0.1184	0.0026	0.1074	2B	0.111	0.119	0.1218	0.1252	0.0034	0.1380
		3A	0.0000	0.1380	0.1329	...	0.1218	0.1198	0.0020	0.1082	3B	0.1110	0.1186	0.1218	0.1243	0.0025	0.1380
8-32 or 0.164-32	UNC	2A	0.0009	0.1631	0.1571	...	0.1428	0.1399	0.0029	0.1259	2B	0.130	0.139	0.1437	0.1475	0.0038	0.1640
		3A	0.0000	0.1640	0.1580	...	0.1437	0.1415	0.0022	0.1268	3B	0.1300	0.1389	0.1437	0.1465	0.0028	0.1640
8-36 or 0.164-36	UNF	2A	0.0008	0.1632	0.1577	...	0.1452	0.1424	0.0028	0.1301	2B	0.134	0.142	0.1460	0.1496	0.0036	0.1640
		3A	0.0000	0.1640	0.1585	...	0.1460	0.1439	0.0021	0.1309	3B	0.1340	0.1416	0.1460	0.1487	0.0027	0.1640

(Notes follow at end of table)

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam.		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance	Max. (4) (Ref.)	Class	Min.	Max.	Min.	Max.	Tolerance	Min.
10-24 or 0.190-24	UNC	2A	0.0010	0.1890	0.1818	...	0.1619	0.1586	0.0033	0.1394	2B	0.145	0.156	0.1629	0.1672	0.0043	0.1900
		3A	0.0000	0.1900	0.1828	...	0.1629	0.1604	0.0025	0.1404	3B	0.1450	0.1555	0.1629	0.1661	0.0032	0.1900
10-32 or 0.190-32	UNF	2A	0.0009	0.1891	0.1831	...	0.1688	0.1658	0.0030	0.1519	2B	0.156	0.164	0.1697	0.1736	0.0039	0.1900
		3A	0.0000	0.1900	0.1840	...	0.1697	0.1674	0.0023	0.1528	3B	0.1560	0.1641	0.1697	0.1726	0.0029	0.1900
12-24 or 0.216-24	UNC	2A	0.0010	0.2150	0.2078	...	0.1879	0.1845	0.0034	0.1654	2B	0.171	0.181	0.1889	0.1933	0.0044	0.2160
		3A	0.0000	0.2160	0.2088	...	0.1889	0.1863	0.0026	0.1664	3B	0.1710	0.1807	0.1889	0.1922	0.0033	0.2160
12-28 or 0.216-28	UNF	2A	0.0010	0.2150	0.2085	...	0.1918	0.1886	0.0032	0.1724	2B	0.177	0.186	0.1928	0.1970	0.0042	0.2160
		3A	0.0000	0.2160	0.2095	...	0.1928	0.1904	0.0024	0.1734	3B	0.1770	0.1857	0.1928	0.1959	0.0031	0.2160
12-32 or 0.216-32	UNEF	2A	0.0009	0.2151	0.2091	...	0.1948	0.1917	0.0031	0.1779	2B	0.182	0.190	0.1957	0.1998	0.0041	0.2160
		3A	0.0000	0.2160	0.2100	...	0.1957	0.1933	0.0024	0.1788	3B	0.1820	0.1895	0.1957	0.1988	0.0031	0.2160
1/4-20 or 0.250-20	UNC	1A	0.0011	0.2489	0.2367	...	0.2164	0.2108	0.0056	0.1894	1B	0.196	0.207	0.2175	0.2248	0.0073	0.2500
		2A	0.0011	0.2489	0.2408	0.2367	0.2164	0.2127	0.0037	0.1894	2B	0.196	0.207	0.2175	0.2224	0.0049	0.2500
		3A	0.0000	0.2500	0.2419	...	0.2175	0.2147	0.0028	0.1905	3B	0.1960	0.2067	0.2175	0.2211	0.0036	0.2500
1/4-28 or 0.250-28	UNF	1A	0.0010	0.2490	0.2392	...	0.2258	0.2208	0.0050	0.2064	1B	0.211	0.220	0.2268	0.2333	0.0065	0.2500
		2A	0.0010	0.2490	0.2425	...	0.2258	0.2225	0.0033	0.2064	2B	0.211	0.220	0.2268	0.2311	0.0043	0.2500
		3A	0.0000	0.2500	0.2435	...	0.2268	0.2243	0.0025	0.2074	3B	0.2110	0.2190	0.2268	0.2300	0.0032	0.2500
1/4-32 or 0.250-32	UNEF	2A	0.0010	0.2490	0.2430	...	0.2287	0.2255	0.0032	0.2118	2B	0.216	0.224	0.2297	0.2339	0.0042	0.2500
		3A	0.0000	0.2500	0.2440	...	0.2297	0.2273	0.0024	0.2128	3B	0.2160	0.2229	0.2297	0.2328	0.0031	0.2500
5/16-18 or 0.3125-18	UNC	1A	0.0012	0.3113	0.2982	...	0.2752	0.2691	0.0061	0.2452	1B	0.252	0.265	0.2764	0.2843	0.0079	0.3125
		2A	0.0012	0.3113	0.3026	0.2982	0.2752	0.2712	0.0040	0.2452	2B	0.252	0.265	0.2764	0.2817	0.0053	0.3125
		3A	0.0000	0.3125	0.3038	...	0.2764	0.2734	0.0030	0.2464	3B	0.2520	0.2630	0.2764	0.2803	0.0039	0.3125
5/16-20 or 0.3125-20	UN	2A	0.0012	0.3113	0.3032	...	0.2788	0.2748	0.0040	0.2518	2B	0.258	0.270	0.2800	0.2852	0.0052	0.3125
		3A	0.0000	0.3125	0.3044	...	0.2800	0.2770	0.0030	0.2530	3B	0.2580	0.2680	0.2800	0.2839	0.0039	0.3125
5/16-24 or 0.3125-24	UNF	1A	0.0011	0.3114	0.3006	...	0.2843	0.2788	0.0055	0.2618	1B	0.267	0.277	0.2854	0.2925	0.0071	0.3125
		2A	0.0011	0.3114	0.3042	...	0.2843	0.2806	0.0037	0.2618	2B	0.267	0.277	0.2854	0.2902	0.0048	0.3125
		3A	0.0000	0.3125	0.3053	...	0.2854	0.2827	0.0027	0.2629	3B	0.2670	0.2754	0.2854	0.2890	0.0036	0.3125
5/16-28 or 0.3125-28	UN	2A	0.0010	0.3115	0.3050	...	0.2883	0.2849	0.0034	0.2689	2B	0.274	0.282	0.2893	0.2937	0.0044	0.3125
		3A	0.0000	0.3125	0.3060	...	0.2893	0.2867	0.0026	0.2699	3B	0.2740	0.2807	0.2893	0.2926	0.0033	0.3125
5/16-32 or 0.3125-32	UNEF	2A	0.0010	0.3115	0.3055	...	0.2912	0.2880	0.0032	0.2743	2B	0.279	0.286	0.2922	0.2964	0.0042	0.3125
		3A	0.0000	0.3125	0.3065	...	0.2922	0.2898	0.0024	0.2753	3B	0.2790	0.2847	0.2922	0.2953	0.0031	0.3125

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance		Class	Min.	Max.	Min.	Max.	Tolerance	Min.
3/8-16 or 0.375-16	UNC	1A	0.0013	0.3737	0.3595	. . .	0.3331	0.3266	0.0065	0.2992	1B	0.307	0.321	0.3344	0.3429	0.0085	0.3750
		2A	0.0013	0.3737	0.3643	0.3595	0.3331	0.3287	0.0044	0.2992	2B	0.307	0.321	0.3344	0.3401	0.0057	0.3750
		3A	0.0000	0.3750	0.3656	. . .	0.3344	0.3311	0.0033	0.3005	3B	0.3070	0.3182	0.3344	0.3387	0.0043	0.3750
3/8-20 or 0.375-20	UN	2A	0.0012	0.3738	0.3657	. . .	0.3413	0.3372	0.0041	0.3143	2B	0.321	0.332	0.3425	0.3479	0.0054	0.3750
		3A	0.0000	0.3750	0.3669	. . .	0.3425	0.3394	0.0031	0.3155	3B	0.3210	0.3297	0.3425	0.3465	0.0040	0.3750
3/8-24 or 0.375-24	UNF	1A	0.0011	0.3739	0.3631	. . .	0.3468	0.3411	0.0057	0.3243	1B	0.330	0.340	0.3479	0.3553	0.0074	0.3750
		2A	0.0011	0.3739	0.3667	. . .	0.3468	0.3430	0.0038	0.3243	2B	0.330	0.340	0.3479	0.3528	0.0049	0.3750
		3A	0.0000	0.3750	0.3678	. . .	0.3479	0.3450	0.0029	0.3254	3B	0.3300	0.3372	0.3479	0.3516	0.0037	0.3750
3/8-28 or 0.375-28	UN	2A	0.0011	0.3739	0.3674	. . .	0.3507	0.3471	0.0036	0.3313	2B	0.336	0.345	0.3518	0.3564	0.0046	0.3750
		3A	0.0000	0.3750	0.3685	. . .	0.3518	0.3491	0.0027	0.3324	3B	0.3360	0.3426	0.3518	0.3553	0.0035	0.3750
3/8-32 or 0.375-32	UNEF	2A	0.0010	0.3740	0.3680	. . .	0.3537	0.3503	0.0034	0.3368	2B	0.341	0.349	0.3547	0.3591	0.0044	0.3750
		3A	0.0000	0.3750	0.3690	. . .	0.3547	0.3522	0.0025	0.3378	3B	0.3410	0.3469	0.3547	0.3580	0.0033	0.3750
7/16-14 or 0.4375-14	UNC	1A	0.0014	0.4361	0.4206	. . .	0.3897	0.3826	0.0071	0.3511	1B	0.360	0.376	0.3911	0.4003	0.0092	0.4375
		2A	0.0014	0.4361	0.4258	0.4206	0.3897	0.3850	0.0047	0.3511	2B	0.360	0.376	0.3911	0.3972	0.0061	0.4375
		3A	0.0000	0.4375	0.4272	. . .	0.3911	0.3876	0.0035	0.3525	3B	0.3600	0.3717	0.3911	0.3957	0.0046	0.4375
7/16-16 or 0.4375-16	UN	2A	0.0014	0.4361	0.4267	. . .	0.3955	0.3909	0.0046	0.3616	2B	0.370	0.384	0.3969	0.4028	0.0059	0.4375
		3A	0.0000	0.4375	0.4281	. . .	0.3969	0.3935	0.0034	0.3630	3B	0.3700	0.3800	0.3969	0.4014	0.0045	0.4375
7/16-20 or 0.4375-20	UNF	1A	0.0013	0.4362	0.4240	. . .	0.4037	0.3975	0.0062	0.3767	1B	0.383	0.395	0.4050	0.4131	0.0081	0.4375
		2A	0.0013	0.4362	0.4281	. . .	0.4037	0.3995	0.0042	0.3767	2B	0.383	0.395	0.4050	0.4104	0.0054	0.4375
		3A	0.0000	0.4375	0.4294	. . .	0.4050	0.4019	0.0031	0.3780	3B	0.3830	0.3916	0.4050	0.4091	0.0041	0.4375
7/16-28 or 0.4375-28	UNEF	2A	0.0011	0.4364	0.4299	. . .	0.4132	0.4096	0.0036	0.3938	2B	0.399	0.407	0.4143	0.4189	0.0046	0.4375
		3A	0.0000	0.4375	0.4310	. . .	0.4143	0.4116	0.0027	0.3949	3B	0.3990	0.4051	0.4143	0.4178	0.0035	0.4375
7/16-32 or 0.4375-32	UN	2A	0.0010	0.4365	0.4305	. . .	0.4162	0.4128	0.0034	0.3993	2B	0.404	0.411	0.4172	0.4216	0.0044	0.4375
		3A	0.0000	0.4375	0.4315	. . .	0.4172	0.4147	0.0025	0.4003	3B	0.4040	0.4094	0.4172	0.4205	0.0033	0.4375
1/2-13 or 0.500-13	UNC	1A	0.0015	0.4985	0.4822	. . .	0.4485	0.4411	0.0074	0.4069	1B	0.417	0.434	0.4500	0.4597	0.0097	0.5000
		2A	0.0015	0.4985	0.4876	0.4822	0.4485	0.4435	0.0050	0.4069	2B	0.417	0.434	0.4500	0.4565	0.0065	0.5000
		3A	0.0000	0.5000	0.4891	. . .	0.4500	0.4463	0.0037	0.4084	3B	0.4170	0.4284	0.4500	0.4548	0.0048	0.5000
1/2-16 or 0.500-16	UN	2A	0.0014	0.4986	0.4892	. . .	0.4580	0.4533	0.0047	0.4241	2B	0.432	0.446	0.4594	0.4655	0.0061	0.5000
		3A	0.0000	0.5000	0.4906	. . .	0.4594	0.4559	0.0035	0.4255	3B	0.4320	0.4419	0.4594	0.4640	0.0046	0.5000
1/2-20 or 0.500-20	UNF	1A	0.0013	0.4987	0.4865	. . .	0.4662	0.4598	0.0064	0.4392	1B	0.446	0.457	0.4675	0.4759	0.0084	0.5000
		2A	0.0013	0.4987	0.4906	. . .	0.4662	0.4619	0.0043	0.4392	2B	0.446	0.457	0.4675	0.4731	0.0056	0.5000
		3A	0.0000	0.5000	0.4919	. . .	0.4675	0.4643	0.0032	0.4405	3B	0.4460	0.4537	0.4675	0.4717	0.0042	0.5000

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance		Class	Min.	Max.	Min.	Max.	Tolerance	Min.
½-28 or 0.500-28	UNEF	2A	0.0011	0.4989	0.4924	. . .	0.4757	0.4720	0.0037	0.4563	2B	0.461	0.470	0.4768	0.4816	0.0048	0.5000
		3A	0.0000	0.5000	0.4935	. . .	0.4768	0.4740	0.0028	0.4574	3B	0.4610	0.4676	0.4768	0.4804	0.0036	0.5000
½-32 or 0.500-32	UN	2A	0.0010	0.4990	0.4930	. . .	0.4787	0.4752	0.0035	0.4618	2B	0.466	0.474	0.4797	0.4842	0.0045	0.5000
		3A	0.0000	0.5000	0.4940	. . .	0.4797	0.4771	0.0026	0.4628	3B	0.4660	0.4719	0.4797	0.4831	0.0034	0.5000
9/16-12 or 0.5625-12	UNC	1A	0.0016	0.5609	0.5437	. . .	0.5068	0.4990	0.0078	0.4617	1B	0.472	0.490	0.5084	0.5186	0.0102	0.5625
		2A	0.0016	0.5609	0.5495	0.5437	0.5068	0.5016	0.0052	0.4617	2B	0.472	0.490	0.5084	0.5152	0.0068	0.5625
		3A	0.0000	0.5625	0.5511	. . .	0.5084	0.5045	0.0039	0.4633	3B	0.4720	0.4843	0.5084	0.5135	0.0051	0.5625
9/16-16 or 0.5625-16	UN	2A	0.0014	0.5611	0.5517	. . .	0.5205	0.5158	0.0047	0.4866	2B	0.495	0.509	0.5219	0.5280	0.0061	0.5625
		3A	0.0000	0.5625	0.5531	. . .	0.5219	0.5184	0.0035	0.4880	3B	0.4950	0.5040	0.5219	0.5265	0.0046	0.5625
9/16-18 or 0.5625-18	UNF	1A	0.0014	0.5611	0.5480	. . .	0.5250	0.5182	0.0068	0.4950	1B	0.502	0.515	0.5264	0.5353	0.0089	0.5625
		2A	0.0014	0.5611	0.5524	. . .	0.5250	0.5205	0.0045	0.4950	2B	0.502	0.515	0.5264	0.5323	0.0059	0.5625
		3A	0.0000	0.5625	0.5538	. . .	0.5264	0.5230	0.0034	0.4964	3B	0.5020	0.5106	0.5264	0.5308	0.0044	0.5625
9/16-20 or 0.5625-20	UN	2A	0.0013	0.5612	0.5531	. . .	0.5287	0.5245	0.0042	0.5017	2B	0.508	0.520	0.5300	0.5355	0.0055	0.5625
		3A	0.0000	0.5625	0.5544	. . .	0.5300	0.5268	0.0032	0.5030	3B	0.5080	0.5162	0.5300	0.5341	0.0041	0.5625
9/16-24 or 0.5625-24	UNEF	2A	0.0012	0.5613	0.5541	. . .	0.5342	0.5303	0.0039	0.5117	2B	0.517	0.527	0.5354	0.5405	0.0051	0.5625
		3A	0.0000	0.5625	0.5553	. . .	0.5354	0.5325	0.0029	0.5129	3B	0.5170	0.5244	0.5354	0.5392	0.0038	0.5625
9/16-28 or 0.5625-28	UN	2A	0.0011	0.5614	0.5549	. . .	0.5382	0.5345	0.0037	0.5188	2B	0.524	0.532	0.5393	0.5441	0.0048	0.5625
		3A	0.0000	0.5625	0.5560	. . .	0.5393	0.5365	0.0028	0.5199	3B	0.5240	0.5301	0.5393	0.5429	0.0036	0.5625
9/16-32 or 0.5625-32	UN	2A	0.0010	0.5615	0.5555	. . .	0.5412	0.5377	0.0035	0.5243	2B	0.529	0.536	0.5422	0.5467	0.0045	0.5625
		3A	0.0000	0.5625	0.5565	. . .	0.5422	0.5396	0.0026	0.5253	3B	0.5290	0.5344	0.5422	0.5456	0.0034	0.5625
5/8-11 or 0.625-11	UNC	1A	0.0016	0.6234	0.6052	. . .	0.5644	0.5561	0.0083	0.5152	1B	0.527	0.546	0.5660	0.5767	0.0107	0.6250
		2A	0.0016	0.6234	0.6113	0.6052	0.5644	0.5589	0.0055	0.5152	2B	0.527	0.546	0.5660	0.5732	0.0072	0.6250
		3A	0.0000	0.6250	0.6129	. . .	0.5660	0.5619	0.0041	0.5168	3B	0.5270	0.5391	0.5660	0.5714	0.0054	0.6250
5/8-12 or 0.625-12	UN	2A	0.0016	0.6234	0.6120	. . .	0.5693	0.5639	0.0054	0.5242	2B	0.535	0.553	0.5709	0.5780	0.0071	0.6250
		3A	0.0000	0.6250	0.6136	. . .	0.5709	0.5668	0.0041	0.5258	3B	0.5350	0.5463	0.5709	0.5762	0.0053	0.6250
5/8-16 or 0.625-16	UN	2A	0.0014	0.6236	0.6142	. . .	0.5830	0.5782	0.0048	0.5491	2B	0.557	0.571	0.5844	0.5906	0.0062	0.6250
		3A	0.0000	0.6250	0.6156	. . .	0.5844	0.5808	0.0036	0.5505	3B	0.5570	0.5662	0.5844	0.5890	0.0046	0.6250
5/8-18 or 0.625-18	UNF	1A	0.0014	0.6236	0.6105	. . .	0.5875	0.5805	0.0070	0.5575	1B	0.565	0.578	0.5889	0.5980	0.0091	0.6250
		2A	0.0014	0.6236	0.6149	. . .	0.5875	0.5828	0.0047	0.5575	2B	0.565	0.578	0.5889	0.5949	0.0060	0.6250
		3A	0.0000	0.6250	0.6163	. . .	0.5889	0.5854	0.0035	0.5589	3B	0.5650	0.5730	0.5889	0.5934	0.0045	0.6250

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance		Class	Min.	Max.	Min.	Max.	Tolerance	Min.
5/8-20 or 0.625-20	UN	2A	0.0013	0.6237	0.6156	...	0.5912	0.5869	0.0043	0.5642	2B	0.571	0.582	0.5925	0.5981	0.0056	0.6250
		3A	0.0000	0.6250	0.6169	...	0.5925	0.5893	0.0032	0.5655	3B	0.5710	0.5787	0.5925	0.5967	0.0042	0.6250
5/8-24 or 0.625-24	UNEF	2A	0.0012	0.6238	0.6166	...	0.5967	0.5927	0.0040	0.5742	2B	0.580	0.590	0.5979	0.6031	0.0052	0.6250
		3A	0.0000	0.6250	0.6178	...	0.5979	0.5949	0.0030	0.5754	3B	0.5800	0.5869	0.5979	0.6018	0.0039	0.6250
5/8-28 or 0.625-28	UN	2A	0.0011	0.6239	0.6174	...	0.6007	0.5969	0.0038	0.5813	2B	0.586	0.595	0.6018	0.6067	0.0049	0.6250
		3A	0.0000	0.6250	0.6185	...	0.6018	0.5990	0.0028	0.5824	3B	0.5860	0.5926	0.6018	0.6055	0.0037	0.6250
5/8-32 or 0.625-32	UN	2A	0.0011	0.6239	0.6179	...	0.6036	0.6000	0.0036	0.5867	2B	0.591	0.590	0.6047	0.6093	0.0046	0.6250
		3A	0.0000	0.6250	0.6190	...	0.6047	0.6020	0.0027	0.5878	3B	0.5910	0.5969	0.6047	0.6082	0.0035	0.6250
11/16-12 or 0.6875-12	UN	2A	0.0016	0.6859	0.6745	...	0.6318	0.6264	0.0054	0.5867	2B	0.597	0.615	0.6334	0.6405	0.0071	0.6875
		3A	0.0000	0.6875	0.6761	...	0.6334	0.6293	0.0041	0.5883	3B	0.5970	0.6085	0.6334	0.6387	0.0053	0.6875
11/16-16 or 0.6875-16	UN	2A	0.0014	0.6861	0.6767	...	0.6455	0.6407	0.0048	0.6116	2B	0.620	0.634	0.6469	0.6531	0.0062	0.6875
		3A	0.0000	0.6875	0.6781	...	0.6469	0.6433	0.0036	0.6130	3B	0.6200	0.6284	0.6469	0.6515	0.0046	0.6875
11/16-20 or 0.6875-20	UN	2A	0.0013	0.6862	0.6781	...	0.6537	0.6494	0.0043	0.6267	2B	0.633	0.645	0.6550	0.6606	0.0056	0.6875
		3A	0.0000	0.6875	0.6794	...	0.6550	0.6518	0.0032	0.6280	3B	0.6330	0.6412	0.6550	0.6592	0.0042	0.6875
11/16-24 or 0.6875-24	UNEF	2A	0.0012	0.6863	0.6791	...	0.6592	0.6552	0.0040	0.6367	2B	0.642	0.652	0.6604	0.6656	0.0052	0.6875
		3A	0.0000	0.6875	0.6803	...	0.6604	0.6574	0.0030	0.6379	3B	0.6420	0.6494	0.6604	0.6643	0.0039	0.6875
11/16-28 or 0.6875-28	UN	2A	0.0011	0.6864	0.6799	...	0.6632	0.6594	0.0038	0.6438	2B	0.649	0.657	0.6643	0.6692	0.0049	0.6875
		3A	0.0000	0.6875	0.6810	...	0.6643	0.6615	0.0028	0.6449	3B	0.6490	0.6551	0.6643	0.6680	0.0037	0.6875
11/16-32 or 0.6875-32	UN	2A	0.0011	0.6864	0.6804	...	0.6661	0.6625	0.0036	0.6492	2B	0.654	0.661	0.6672	0.6718	0.0046	0.6875
		3A	0.0000	0.6875	0.6815	...	0.6672	0.6645	0.0027	0.6503	3B	0.6540	0.6594	0.6672	0.6707	0.0035	0.6875
3/4-10 or 0.750-10	UNC	1A	0.0018	0.7482	0.7288	...	0.6832	0.6744	0.0088	0.6291	1B	0.642	0.663	0.6850	0.6965	0.0115	0.7500
		2A	0.0018	0.7482	0.7353	0.7288	0.6832	0.6773	0.0059	0.6291	2B	0.642	0.663	0.6850	0.6927	0.0077	0.7500
		3A	0.0000	0.7500	0.7371	...	0.6850	0.6806	0.0044	0.6309	3B	0.6420	0.6545	0.6850	0.6907	0.0057	0.7500
3/4-12 or 0.750-12	UN	2A	0.0017	0.7483	0.7369	...	0.6942	0.6887	0.0055	0.6491	2B	0.660	0.678	0.6959	0.7031	0.0072	0.7500
		3A	0.0000	0.7500	0.7386	...	0.6959	0.6918	0.0041	0.6508	3B	0.6600	0.6707	0.6959	0.7013	0.0054	0.7500
3/4-16 or 0.750-16	UNF	1A	0.0015	0.7485	0.7343	...	0.7079	0.7004	0.0075	0.6740	1B	0.682	0.696	0.7094	0.7192	0.0098	0.7500
		2A	0.0015	0.7485	0.7391	...	0.7079	0.7029	0.0050	0.6740	2B	0.682	0.696	0.7094	0.7159	0.0065	0.7500
		3A	0.0000	0.7500	0.7406	...	0.7094	0.7056	0.0038	0.6755	3B	0.6820	0.6908	0.7094	0.7143	0.0049	0.7500
3/4-20 or 0.750-20	UNEF	2A	0.0013	0.7487	0.7406	...	0.7162	0.7118	0.0044	0.6892	2B	0.696	0.707	0.7175	0.7232	0.0057	0.7500
		3A	0.0000	0.7500	0.7419	...	0.7175	0.7142	0.0033	0.6905	3B	0.6960	0.7037	0.7175	0.7218	0.0043	0.7500

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam.		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance	Max. (4) (Ref.)	Class	Min.	Max.	Min.	Max.	Tolerance	Min.
3/4-28 or 0.750-28	UN	2A	0.0012	0.7488	0.7423	...	0.7256	0.7218	0.0038	0.7062	2B	0.711	0.720	0.7268	0.7318	0.0050	0.7500
		3A	0.0000	0.7500	0.7435	...	0.7268	0.7239	0.0029	0.7074	3B	0.7110	0.7176	0.7268	0.7305	0.0037	0.7500
3/4-32 or 0.750-32	UN	2A	0.0011	0.7489	0.7429	...	0.7286	0.7250	0.0036	0.7117	2B	0.716	0.724	0.7297	0.7344	0.0047	0.7500
		3A	0.0000	0.7500	0.7440	...	0.7297	0.7270	0.0027	0.7128	3B	0.7160	0.7219	0.7297	0.7333	0.0036	0.7500
13/16-12 or 0.8125-12	UN	2A	0.0017	0.8108	0.7994	...	0.7567	0.7512	0.0055	0.7116	2B	0.722	0.740	0.7584	0.7656	0.0072	0.8125
		3A	0.0000	0.8125	0.8011	...	0.7584	0.7543	0.0041	0.7133	3B	0.7220	0.7329	0.7584	0.7638	0.0054	0.8125
13/16-16 or 0.8125-16	UN	2A	0.0015	0.8110	0.8016	...	0.7704	0.7655	0.0049	0.7365	2B	0.745	0.759	0.7719	0.7782	0.0063	0.8125
		3A	0.0000	0.8125	0.8031	...	0.7719	0.7683	0.0036	0.7380	3B	0.7450	0.7533	0.7719	0.7766	0.0047	0.8125
13/16-20 or 0.8125-20	UNEF	2A	0.0013	0.8112	0.8031	...	0.7787	0.7743	0.0044	0.7517	2B	0.758	0.770	0.7800	0.7857	0.0057	0.8125
		3A	0.0000	0.8125	0.8044	...	0.7800	0.7767	0.0033	0.7530	3B	0.7580	0.7662	0.7800	0.7843	0.0043	0.8125
13/16-28 or 0.8125-28	UN	2A	0.0012	0.8113	0.8048	...	0.7881	0.7843	0.0038	0.7687	2B	0.774	0.782	0.7893	0.7943	0.0050	0.8125
		3A	0.0000	0.8125	0.8060	...	0.7893	0.7864	0.0029	0.7699	3B	0.7740	0.7801	0.7893	0.7930	0.0037	0.8125
13/16-32 or 0.8125-32	UN	2A	0.0011	0.8114	0.8054	...	0.7911	0.7875	0.0036	0.7742	2B	0.779	0.786	0.7922	0.7969	0.0047	0.8125
		3A	0.0000	0.8125	0.8065	...	0.7922	0.7895	0.0027	0.7753	3B	0.7790	0.7844	0.7922	0.7958	0.0036	0.8125
7/8-9 or 0.875-9	UNC	1A	0.0019	0.8731	0.8523	...	0.8009	0.7914	0.0095	0.7408	1B	0.755	0.778	0.8028	0.8151	0.0123	0.8750
		2A	0.0019	0.8731	0.8592	0.8523	0.8009	0.7946	0.0063	0.7408	2B	0.755	0.778	0.8028	0.8110	0.0082	0.8750
		3A	0.0000	0.8750	0.8611	...	0.8028	0.7981	0.0047	0.7427	3B	0.7550	0.7681	0.8028	0.8089	0.0061	0.8750
7/8-12 or 0.875-12	UN	2A	0.0017	0.8733	0.8619	...	0.8192	0.8137	0.0055	0.7741	2B	0.785	0.803	0.8209	0.8281	0.0072	0.8750
		3A	0.0000	0.8750	0.8636	...	0.8209	0.8168	0.0041	0.7758	3B	0.7850	0.7948	0.8209	0.8263	0.0054	0.8750
7/8-14 or 0.875-14	UNF	1A	0.0016	0.8734	0.8579	...	0.8270	0.8189	0.0081	0.7884	1B	0.798	0.814	0.8286	0.8392	0.0106	0.8750
		2A	0.0016	0.8734	0.8631	...	0.8270	0.8216	0.0054	0.7884	2B	0.798	0.814	0.8286	0.8356	0.0070	0.8750
		3A	0.0000	0.8750	0.8647	...	0.8286	0.8245	0.0041	0.7900	3B	0.7980	0.8068	0.8286	0.8339	0.0053	0.8750
7/8-16 or 0.875-16	UN	2A	0.0015	0.8735	0.8641	...	0.8329	0.8280	0.0049	0.7900	2B	0.807	0.821	0.8344	0.8407	0.0063	0.8750
		3A	0.0000	0.8750	0.8656	...	0.8344	0.8308	0.0036	0.8005	3B	0.8070	0.8158	0.8344	0.8391	0.0047	0.8750
7/8-20 or 0.875-20	UNEF	2A	0.0013	0.8737	0.8656	...	0.8412	0.8368	0.0044	0.8142	2B	0.821	0.832	0.8425	0.8482	0.0057	0.8750
		3A	0.0000	0.8750	0.8669	...	0.8425	0.8392	0.0033	0.8155	3B	0.8210	0.8287	0.8425	0.8468	0.0043	0.8750
7/8-28 or 0.875-28	UN	2A	0.0012	0.8738	0.8673	...	0.8506	0.8468	0.0038	0.8312	2B	0.836	0.845	0.8518	0.8568	0.0050	0.8750
		3A	0.0000	0.8750	0.8685	...	0.8518	0.8489	0.0029	0.8324	3B	0.8360	0.8426	0.8518	0.8555	0.0037	0.8750
7/8-32 or 0.875-32	UN	2A	0.0011	0.8739	0.8679	...	0.8536	0.8500	0.0036	0.8367	2B	0.841	0.849	0.8547	0.8594	0.0047	0.8750
		3A	0.0000	0.8750	0.8690	...	0.8547	0.8520	0.0027	0.8378	3B	0.8410	0.8469	0.8547	0.8583	0.0036	0.8750

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance		Class	Min.	Max.	Min.	Max.	Tolerance	Min.
15/16-12 or 0.9375-12	UN	2A	0.0017	0.9358	0.9244	...	0.8817	0.8760	0.0057	0.8366	2B	0.847	0.865	0.8834	0.8908	0.0074	0.9375
		3A	0.0000	0.9375	0.9261	...	0.8834	0.8793	0.0041	0.8383	3B	0.8470	0.8575	0.8834	0.8889	0.0055	0.9375
15/16-16 or 0.9375-16	UN	2A	0.0015	0.9360	0.9266	...	0.8954	0.8904	0.0050	0.8615	2B	0.870	0.884	0.8969	0.9034	0.0065	0.9375
		3A	0.0000	0.9375	0.9281	...	0.8969	0.8932	0.0037	0.8630	3B	0.8700	0.8783	0.8969	0.9018	0.0049	0.9375
15/16-20 or 0.9375-20	UNEF	2A	0.0014	0.9361	0.9280	...	0.9036	0.8991	0.0045	0.8766	2B	0.883	0.895	0.9050	0.9109	0.0059	0.9375
		3A	0.0000	0.9375	0.9294	...	0.9050	0.9016	0.0034	0.8780	3B	0.8830	0.8912	0.9050	0.9094	0.0044	0.9375
15/16-28 or 0.9375-28	UN	2A	0.0012	0.9363	0.9298	...	0.9131	0.9091	0.0040	0.8937	2B	0.899	0.907	0.9143	0.9195	0.0052	0.9375
		3A	0.0000	0.9375	0.9310	...	0.9143	0.9113	0.0030	0.8949	3B	0.8990	0.9051	0.9143	0.9182	0.0039	0.9375
15/16-32 or 0.9375-32	UN	2A	0.0011	0.9364	0.9304	...	0.9161	0.9123	0.0038	0.8992	2B	0.904	0.911	0.9172	0.9221	0.0049	0.9375
		3A	0.0000	0.9375	0.9315	...	0.9172	0.9144	0.0028	0.9003	3B	0.9040	0.9094	0.9172	0.9209	0.0037	0.9375
1-8 or 1.000-8	UNC	1A	0.0020	0.9980	0.9755	...	0.9168	0.9067	0.0101	0.8492	1B	0.865	0.890	0.9188	0.9320	0.0132	1.0000
		2A	0.0020	0.9980	0.9830	0.9755	0.9168	0.9100	0.0068	0.8492	2B	0.865	0.890	0.9188	0.9276	0.0088	1.0000
		3A	0.0000	1.0000	0.9850	...	0.9188	0.9137	0.0051	0.8512	3B	0.8650	0.8797	0.9188	0.9254	0.0066	1.0000
1-12 or 1.000-12	UNF	1A	0.0018	0.9982	0.9810	...	0.9441	0.9353	0.0088	0.8990	1B	0.910	0.928	0.9459	0.9573	0.0114	1.0000
		2A	0.0018	0.9982	0.9868	...	0.9441	0.9382	0.0059	0.8990	2B	0.910	0.928	0.9459	0.9535	0.0076	1.0000
		3A	0.0000	1.0000	0.9886	...	0.9459	0.9415	0.0044	0.9008	3B	0.9100	0.9198	0.9459	0.9516	0.0057	1.0000
1-14 or 1.000-14	UNS (5)	1A	0.0017	0.9983	0.9828	...	0.9519	0.9435	0.0084	0.9132	1B	0.923	0.938	0.9536	0.9645	0.0109	1.0000
		2A	0.0017	0.9983	0.9880	...	0.9519	0.9463	0.0056	0.9132	2B	0.923	0.938	0.9536	0.9609	0.0073	1.0000
		3A	0.0000	1.0000	0.9897	...	0.9536	0.9494	0.0042	0.9149	3B	0.9230	0.9315	0.9536	0.9590	0.0054	1.0000
1-16 or 1.000-16	UN	2A	0.0015	0.9985	0.9891	...	0.9579	0.9529	0.0050	0.9240	2B	0.932	0.946	0.9594	0.9659	0.0065	1.0000
		3A	0.0000	1.0000	0.9906	...	0.9594	0.9557	0.0037	0.9255	3B	0.9320	0.9408	0.9594	0.9643	0.0049	1.0000
1-20 or 1.000-20	UNEF	2A	0.0014	0.9986	0.9905	...	0.9661	0.9616	0.0045	0.9391	2B	0.946	0.957	0.9675	0.9734	0.0059	1.0000
		3A	0.0000	1.0000	0.9919	...	0.9675	0.9641	0.0034	0.9405	3B	0.9460	0.9537	0.9675	0.9719	0.0044	1.0000
1-28 or 1.000-28	UN	2A	0.0012	0.9988	0.9923	...	0.9756	0.9716	0.0040	0.9562	2B	0.961	0.970	0.9768	0.9820	0.0052	1.0000
		3A	0.0000	1.0000	0.9935	...	0.9768	0.9738	0.0030	0.9574	3B	0.9610	0.9676	0.9768	0.9807	0.0039	1.0000
1-32 or 1.000-32	UN	2A	0.0011	0.9989	0.9929	...	0.9786	0.9748	0.0038	0.9617	2B	0.966	0.974	0.9797	0.9846	0.0049	1.0000
		3A	0.0000	1.0000	0.9940	...	0.9797	0.9769	0.0028	0.9628	3B	0.9660	0.9719	0.9797	0.9834	0.0037	1.0000
1 1/16-8 or 1.0625-8	UN	2A	0.0020	1.0605	1.0455	...	0.9793	0.9725	0.0068	0.9117	2B	0.927	0.952	0.9813	0.9902	0.0089	1.0625
		3A	0.0000	1.0625	1.0475	...	0.9813	0.9762	0.0051	0.9137	3B	0.9270	0.9422	0.9813	0.9880	0.0067	1.0625

(Notes follow at end of table)

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)								Internal (1)						
		Class	Allowance	Major Diameter			Pitch Diameter		UNR Minor Diam. Max. (4) (Ref.)	Class	Minor Diameter		Pitch Diameter			Major Diameter
				Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance				Min.	Max.	Tolerance	Min.
1 1/16-12 or 1.0625-12	UN	2A	0.0017	1.0608	1.0494	...	1.0067	1.0010	0.0057	0.9616	2B	0.972	0.990	1.0084	1.0158	0.0074	1.0625
		3A	0.0000	1.0625	1.0511	...	1.0084	1.0042	0.0042	0.9633	3B	0.9720	0.9823	1.0084	1.0139	0.0055	1.0625
1 1/16-16 or 1.0625-16	UN	2A	0.0015	1.0610	1.0516	...	1.0204	1.0154	0.0050	0.9865	2B	0.995	1.009	1.0219	1.0284	0.0065	1.0625
		3A	0.0000	1.0625	1.0531	...	1.0219	1.0182	0.0037	0.9880	3B	0.9950	1.0033	1.0219	1.0268	0.0049	1.0625
1 1/16-18 or 1.0625-18	UNEF	2A	0.0014	1.0611	1.0524	...	1.0250	1.0203	0.0047	0.9950	2B	1.002	1.015	1.0264	1.0326	0.0062	1.0625
		3A	0.0000	1.0625	1.0538	...	1.0264	1.0228	0.0036	0.9964	3B	1.0020	1.0105	1.0264	1.0310	0.0046	1.0625
1 1/16-20 or 1.0625-20	UN	2A	0.0014	1.0611	1.0530	...	1.0286	1.0241	0.0045	1.0016	2B	1.008	1.020	1.0300	1.0359	0.0059	1.0625
		3A	0.0000	1.0625	1.0544	...	1.0300	1.0266	0.0034	1.0030	3B	1.0080	1.0162	1.0300	1.0344	0.0044	1.0625
1 1/16-28 or 1.0625-28	UN	2A	0.0012	1.0613	1.0548	...	1.0381	1.0341	0.0040	1.0187	2B	1.024	1.032	1.0393	1.0445	0.0052	1.0625
		3A	0.0000	1.0625	1.0560	...	1.0393	1.0363	0.0030	1.0199	3B	1.0240	1.0301	1.0393	1.0432	0.0039	1.0625
1 1/8-7 or 1.125-7	UNC	1A	0.0022	1.1228	1.0982	...	1.0300	1.0191	0.0109	0.9527	1B	0.970	0.998	1.0322	1.0463	0.0141	1.1250
		2A	0.0022	1.1228	1.1064	1.0982	1.0300	1.0228	0.0072	0.9527	2B	0.970	0.998	1.0322	1.0416	0.0094	1.1250
		3A	0.0000	1.1250	1.1086	...	1.0322	1.0268	0.0054	0.9549	3B	0.9700	0.9875	1.0322	1.0393	0.0071	1.1250
1 1/8-8 or 1.125-8	UN	2A	0.0021	1.1229	1.1079	1.1004	1.0417	1.0348	0.0069	0.9741	2B	0.990	1.015	1.0438	1.0528	0.0090	1.1250
		3A	0.0000	1.1250	1.1100	...	1.0438	1.0386	0.0052	0.9762	3B	0.9900	1.0047	1.0438	1.0505	0.0067	1.1250
1 1/8-12 or 1.125-12	UNF	1A	0.0018	1.1232	1.1060	...	1.0691	1.0601	0.0090	1.0240	1B	1.035	1.053	1.0709	1.0826	0.0117	1.1250
		2A	0.0018	1.1232	1.1118	...	1.0691	1.0631	0.0060	1.0240	2B	1.035	1.053	1.0709	1.0787	0.0078	1.1250
		3A	0.0000	1.1250	1.1136	...	1.0709	1.0664	0.0045	1.0258	3B	1.0350	1.0448	1.0709	1.0768	0.0059	1.1250
1 1/8-16 or 1.125-16	UN	2A	0.0015	1.1235	1.1141	...	1.0829	1.0779	0.0050	1.0490	2B	1.057	1.071	1.0844	1.0909	0.0065	1.1250
		3A	0.0000	1.1250	1.1156	...	1.0844	1.0807	0.0037	1.0505	3B	1.0570	1.0658	1.0844	1.0893	0.0049	1.1250
1 1/8-18 or 1.125-18	UNEF	2A	0.0014	1.1236	1.1149	...	1.0875	1.0828	0.0047	1.0575	2B	1.065	1.078	1.0889	1.0951	0.0062	1.1250
		3A	0.0000	1.1250	1.1163	...	1.0889	1.0853	0.0036	1.0589	3B	1.0650	1.0730	1.0889	1.0935	0.0046	1.1250
1 1/8-20 or 1.125-20	UN	2A	0.0014	1.1236	1.1155	...	1.0911	1.0866	0.0045	1.0641	2B	1.071	1.082	1.0925	1.0984	0.0059	1.1250
		3A	0.0000	1.1250	1.1169	...	1.0925	1.0891	0.0034	1.0655	3B	1.0710	1.0787	1.0925	1.0969	0.0044	1.1250
1 1/8-28 or 1.125-28	UN	2A	0.0012	1.1238	1.1173	...	1.1006	1.0966	0.0040	1.0812	2B	1.086	1.095	1.1018	1.1070	0.0052	1.1250
		3A	0.0000	1.1250	1.1185	...	1.1018	1.0988	0.0030	1.0824	3B	1.0860	1.0926	1.1018	1.1057	0.0039	1.1250
1 3/16-8 or 1.1875-8	UN	2A	0.0021	1.1854	1.1704	...	1.1042	1.0972	0.0070	1.0366	2B	1.052	1.077	1.1063	1.1154	0.0091	1.1875
		3A	0.0000	1.1875	1.1725	...	1.1063	1.1011	0.0052	1.0387	3B	1.0520	1.0672	1.1063	1.1131	0.0068	1.1875
1 3/16-12 or 1.1875-12	UN	2A	0.0017	1.1858	1.1744	...	1.1317	1.1259	0.0058	1.0866	2B	1.097	1.115	1.1334	1.1409	0.0075	1.1875
		3A	0.0000	1.1875	1.1761	...	1.1334	1.1291	0.0043	1.0883	3B	1.0970	1.1073	1.1334	1.1390	0.0056	1.1875

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)								Internal (1)						
		Class	Allowance	Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)	Class	Minor Diameter		Pitch Diameter		Major Diameter
				Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance			Min.	Max.	Min.	Max.	Min.
1 3/16-16 or 1.1875-16	UN	2A	0.0015	1.1860	1.1766	...	1.1454	1.1403	0.0051	1.1115	2B	1.120	1.134	1.1469	1.1535	1.1875
		3A	0.0000	1.1875	1.1781	...	1.1469	1.1431	0.0038	1.1130	3B	1.1200	1.1283	1.1469	1.1519	1.1875
1 3/16-18 or 1.1875-18	UNEF	2A	0.0015	1.1860	1.1773	...	1.1499	1.1450	0.0049	1.1199	2B	1.127	1.140	1.1514	1.1577	1.1875
		3A	0.0000	1.1875	1.1788	...	1.1514	1.1478	0.0036	1.1214	3B	1.1270	1.1355	1.1514	1.1561	1.1875
1 3/16-20 or 1.1875-20	UN	2A	0.0014	1.1861	1.1780	...	1.1536	1.1489	0.0047	1.1266	2B	1.133	1.145	1.1550	1.1611	1.1875
		3A	0.0000	1.1875	1.1794	...	1.1550	1.1515	0.0035	1.1280	3B	1.1330	1.1412	1.1550	1.1595	1.1875
1 3/16-28 or 1.1875-28	UN	2A	0.0012	1.1863	1.1798	...	1.1631	1.1590	0.0041	1.1437	2B	1.149	1.157	1.1643	1.1696	1.1875
		3A	0.0000	1.1875	1.1810	...	1.1643	1.1612	0.0031	1.1449	3B	1.1490	1.1551	1.1643	1.1683	1.1875
1 1/4-7 or 1.250-7	UNC	1A	0.0022	1.2478	1.2232	...	1.1550	1.1439	0.0111	1.0777	1B	1.095	1.123	1.1572	1.1716	1.2500
		2A	0.0022	1.2478	1.2314	1.2232	1.1550	1.1476	0.0074	1.0777	2B	1.095	1.123	1.1572	1.1668	1.2500
		3A	0.0000	1.2500	1.2336	...	1.1572	1.1517	0.0055	1.0799	3B	1.0950	1.1125	1.1572	1.1644	1.2500
1 1/4-8 or 1.250-8	UN	2A	0.0021	1.2479	1.2329	1.2254	1.1667	1.1597	0.0070	1.0991	2B	1.115	1.140	1.1688	1.1780	1.2500
		3A	0.0000	1.2500	1.2350	...	1.1688	1.1635	0.0053	1.1012	3B	1.1150	1.1297	1.1688	1.1757	1.2500
1 1/4-12 or 1.250-12	UNF	1A	0.0018	1.2482	1.2310	...	1.1941	1.1849	0.0092	1.1490	1B	1.160	1.178	1.1959	1.2079	1.2500
		2A	0.0018	1.2482	1.2368	...	1.1941	1.1879	0.0062	1.1490	2B	1.160	1.178	1.1959	1.2039	1.2500
		3A	0.0000	1.2500	1.2386	...	1.1959	1.1913	0.0046	1.1508	3B	1.1600	1.1698	1.1959	1.2019	1.2500
1 1/4-16 or 1.250-16	UN	2A	0.0015	1.2485	1.2391	...	1.2079	1.2028	0.0051	1.1740	2B	1.182	1.196	1.2094	1.2160	1.2500
		3A	0.0000	1.2500	1.2406	...	1.2094	1.2056	0.0038	1.1755	3B	1.1820	1.1908	1.2094	1.2144	1.2500
1 1/4-18 or 1.250-18	UNEF	2A	0.0015	1.2485	1.2398	...	1.2124	1.2075	0.0049	1.1824	2B	1.190	1.203	1.2139	1.2202	1.2500
		3A	0.0000	1.2500	1.2413	...	1.2139	1.2103	0.0036	1.1839	3B	1.1900	1.1980	1.2139	1.2186	1.2500
1 1/4-20 or 1.250-20	UN	2A	0.0014	1.2486	1.2405	...	1.2161	1.2114	0.0047	1.1891	2B	1.196	1.207	1.2175	1.2236	1.2500
		3A	0.0000	1.2500	1.2419	...	1.2175	1.2140	0.0035	1.1905	3B	1.1960	1.2037	1.2175	1.2220	1.2500
1 1/4-28 or 1.250-28	UN	2A	0.0012	1.2488	1.2423	...	1.2256	1.2215	0.0041	1.2062	2B	1.211	1.220	1.2268	1.2321	1.2500
		3A	0.0000	1.2500	1.2435	...	1.2268	1.2237	0.0031	1.2074	3B	1.2110	1.2176	1.2268	1.2308	1.2500
1 5/16-8 or 1.3125-8	UN	2A	0.0021	1.3104	1.2954	...	1.2292	1.2221	0.0071	1.1616	2B	1.177	1.202	1.2313	1.2405	1.3125
		3A	0.0000	1.3125	1.2975	...	1.2313	1.2260	0.0053	1.1637	3B	1.1770	1.1922	1.2313	1.2382	1.3125
1 5/16-12 or 1.3125-12	UN	2A	0.0017	1.3108	1.2994	...	1.2567	1.2509	0.0058	1.2116	2B	1.222	1.240	1.2584	1.2659	1.3125
		3A	0.0000	1.3125	1.3011	...	1.2584	1.2541	0.0043	1.2133	3B	1.2220	1.2323	1.2584	1.2640	1.3125
1 5/16-16 or 1.3125-16	UN	2A	0.0015	1.3110	1.3016	...	1.2704	1.2653	0.0051	1.2365	2B	1.245	1.259	1.2719	1.2785	1.3125
		3A	0.0000	1.3125	1.3031	...	1.2719	1.2681	0.0038	1.2380	3B	1.2450	1.2533	1.2719	1.2769	1.3125

(Notes follow at end of table)

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance		Class	Min.	Max.	Min.	Max.	Tolerance	Min.
1 5/16-18 or 1.3125-18	UNEF	2A	0.0015	1.3110	1.3023	...	1.2749	1.2700	0.0049	1.2449	2B	1.252	1.265	1.2764	1.2827	0.0063	1.3125
		3A	0.0000	1.3125	1.3038	...	1.2764	1.2728	0.0036	1.2464	3B	1.2520	1.2605	1.2764	1.2811	0.0047	1.3125
1 5/16-20 or 1.3125-20	UN	2A	0.0014	1.3111	1.3030	...	1.2786	1.2739	0.0047	1.2516	2B	1.258	1.270	1.2800	1.2861	0.0061	1.3125
		3A	0.0000	1.3125	1.3044	...	1.2800	1.2765	0.0035	1.2530	3B	1.2580	1.2662	1.2800	1.2845	0.0045	1.3125
1 5/16-28 or 1.3125-28	UN	2A	0.0012	1.3113	1.3048	...	1.2881	1.2840	0.0041	1.2687	2B	1.274	1.282	1.2893	1.2946	0.0053	1.3125
		3A	0.0000	1.3125	1.3060	...	1.2893	1.2862	0.0031	1.2699	3B	1.2740	1.2801	1.2893	1.2933	0.0040	1.3125
1 3/8-6 or 1.375-6	UNC	1A	0.0024	1.3726	1.3453	...	1.2643	1.2523	0.0120	1.1742	1B	1.195	1.225	1.2667	1.2822	0.0155	1.3750
		2A	0.0024	1.3726	1.3544	1.3453	1.2643	1.2563	0.0080	1.1742	2B	1.195	1.225	1.2667	1.2771	0.0104	1.3750
		3A	0.0000	1.3750	1.3568	...	1.2667	1.2607	0.0060	1.1766	3B	1.1950	1.2146	1.2667	1.2745	0.0078	1.3750
1 3/8-8 or 1.375-8	UN	2A	0.0022	1.3728	1.3578	1.3503	1.2916	1.2844	0.0072	1.2240	2B	1.240	1.265	1.2938	1.3031	0.0093	1.3750
		3A	0.0000	1.3750	1.3600	...	1.2938	1.2884	0.0054	1.2262	3B	1.2400	1.2547	1.2938	1.3008	0.0070	1.3750
1 3/8-12 or 1.375-12	UNF	1A	0.0019	1.3731	1.3559	...	1.3190	1.3096	0.0094	1.2739	1B	1.285	1.303	1.3209	1.3332	0.0123	1.3750
		2A	0.0019	1.3731	1.3617	...	1.3190	1.3127	0.0063	1.2739	2B	1.285	1.303	1.3209	1.3291	0.0082	1.3750
		3A	0.0000	1.3750	1.3636	...	1.3209	1.3162	0.0047	1.2758	3B	1.2850	1.2948	1.3209	1.3270	0.0061	1.3750
1 3/8-16 or 1.375-16	UN	2A	0.0015	1.3735	1.3641	...	1.3329	1.3278	0.0051	1.2990	2B	1.307	1.321	1.3344	1.3410	0.0066	1.3750
		3A	0.0000	1.3750	1.3656	...	1.3344	1.3306	0.0038	1.3005	3B	1.3070	1.3158	1.3344	1.3394	0.0050	1.3750
1 3/8-18 or 1.375-18	UNEF	2A	0.0015	1.3735	1.3648	...	1.3374	1.3325	0.0049	1.3074	2B	1.315	1.328	1.3389	1.3452	0.0063	1.3750
		3A	0.0000	1.3750	1.3663	...	1.3389	1.3353	0.0036	1.3089	3B	1.3150	1.3230	1.3389	1.3436	0.0047	1.3750
1 3/8-20 or 1.375-20	UN	2A	0.0014	1.3736	1.3655	...	1.3411	1.3364	0.0047	1.3141	2B	1.321	1.332	1.3425	1.3486	0.0061	1.3750
		3A	0.0000	1.3750	1.3669	...	1.3425	1.3390	0.0035	1.3155	3B	1.3210	1.3287	1.3425	1.3470	0.0045	1.3750
1 3/8-28 or 1.375-28	UN	2A	0.0012	1.3738	1.3673	...	1.3506	1.3465	0.0041	1.3312	2B	1.336	1.345	1.3518	1.3571	0.0053	1.3750
		3A	0.0000	1.3750	1.3685	...	1.3518	1.3487	0.0031	1.3324	3B	1.3360	1.3426	1.3518	1.3558	0.0040	1.3750
1 7/16-6 or 1.4375-6	UN	2A	0.0024	1.4351	1.4169	...	1.3268	1.3188	0.0080	1.2367	2B	1.257	1.288	1.3292	1.3396	0.0104	1.4375
		3A	0.0000	1.4375	1.4193	...	1.3292	1.3232	0.0060	1.2391	3B	1.2570	1.2771	1.3292	1.3370	0.0078	1.4375
1 7/16-8 or 1.4375-8	UN	2A	0.0022	1.4353	1.4203	...	1.3541	1.3469	0.0072	1.2865	2B	1.302	1.327	1.3563	1.3657	0.0094	1.4375
		3A	0.0000	1.4375	1.4225	...	1.3563	1.3509	0.0054	1.2887	3B	1.3020	1.3172	1.3563	1.3634	0.0071	1.4375
1 7/16-12 or 1.4375-12	UN	2A	0.0018	1.4357	1.4243	...	1.3816	1.3757	0.0059	1.3365	2B	1.347	1.365	1.3834	1.3910	0.0076	1.4375
		3A	0.0000	1.4375	1.4261	...	1.3834	1.3790	0.0044	1.3383	3B	1.3470	1.3573	1.3834	1.3891	0.0057	1.4375
1 7/16-16 or 1.4375-16	UN	2A	0.0016	1.4359	1.4265	...	1.3953	1.3901	0.0052	1.3614	2B	1.370	1.384	1.3969	1.4037	0.0068	1.4375
		3A	0.0000	1.4375	1.4281	...	1.3969	1.3930	0.0039	1.3630	3B	1.3700	1.3783	1.3969	1.4020	0.0051	1.4375

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance		Class	Min.	Max.	Min.	Max.	Tolerance	Min.
1 7/16-18 or 1.4375-18	UNEF	2A	0.0015	1.4360	1.4273	...	1.3999	1.3949	0.0050	1.3699	2B	1.377	1.390	1.4014	1.4079	0.0065	1.4375
		3A	0.0000	1.4375	1.4288	...	1.4014	1.3977	0.0037	1.3714	3B	1.3770	1.3855	1.4014	1.4062	0.0048	1.4375
1 7/16-20 or 1.4375-20	UN	2A	0.0014	1.4361	1.4280	...	1.4036	1.3988	0.0048	1.3766	2B	1.383	1.395	1.4050	1.4112	0.0062	1.4375
		3A	0.0000	1.4375	1.4294	...	1.4050	1.4014	0.0036	1.3780	3B	1.3830	1.3912	1.4050	1.4096	0.0046	1.4375
1 7/16-28 or 1.4375-28	UN	2A	0.0013	1.4362	1.4297	...	1.4130	1.4088	0.0042	1.3936	2B	1.399	1.407	1.4143	1.4198	0.0055	1.4375
		3A	0.0000	1.4375	1.4310	...	1.4143	1.4112	0.0031	1.3949	3B	1.3990	1.4051	1.4143	1.4184	0.0041	1.4375
1 1/2-6 or 1.500-6	UNC	1A	0.0024	1.4976	1.4703	...	1.3893	1.3772	0.0121	1.2992	1B	1.320	1.350	1.3917	1.4075	0.0158	1.5000
		2A	0.0024	1.4976	1.4794	1.4703	1.3893	1.3812	0.0081	1.2992	2B	1.320	1.350	1.3917	1.4022	0.0105	1.5000
		3A	0.0000	1.5000	1.4818	...	1.3917	1.3856	0.0061	1.3016	3B	1.3200	1.3396	1.3917	1.3996	0.0079	1.5000
1 1/2-8 or 1.500-8	UN	2A	0.0022	1.4978	1.4828	1.4753	1.4166	1.4093	0.0073	1.3490	2B	1.365	1.390	1.4188	1.4283	0.0095	1.5000
		3A	0.0000	1.5000	1.4850	...	1.4188	1.4133	0.0055	1.3512	3B	1.3650	1.3797	1.4188	1.4259	0.0071	1.5000
1 1/2-12 or 1.500-12	UNF	1A	0.0019	1.4981	1.4809	...	1.4440	1.4344	0.0096	1.3989	1B	1.410	1.428	1.4459	1.4584	0.0125	1.5000
		2A	0.0019	1.4981	1.4867	...	1.4440	1.4376	0.0064	1.3989	2B	1.410	1.428	1.4459	1.4542	0.0083	1.5000
		3A	0.0000	1.5000	1.4886	...	1.4459	1.4411	0.0048	1.4008	3B	1.4100	1.4198	1.4459	1.4522	0.0063	1.5000
1 1/2-16 or 1.500-16	UN	2A	0.0016	1.4984	1.4890	...	1.4578	1.4526	0.0052	1.4239	2B	1.432	1.446	1.4594	1.4662	0.0068	1.5000
		3A	0.0000	1.5000	1.4906	...	1.4594	1.4555	0.0039	1.4255	3B	1.4320	1.4408	1.4594	1.4645	0.0051	1.5000
1 1/2-18 or 1.500-18	UNEF	2A	0.0015	1.4985	1.4898	...	1.4624	1.4574	0.0050	1.4324	2B	1.440	1.452	1.4639	1.4704	0.0065	1.5000
		3A	0.0000	1.5000	1.4913	...	1.4639	1.4602	0.0037	1.4339	3B	1.4400	1.4480	1.4639	1.4687	0.0048	1.5000
1 1/2-20 or 1.500-20	UN	2A	0.0014	1.4986	1.4905	...	1.4661	1.4613	0.0048	1.4391	2B	1.446	1.457	1.4675	1.4737	0.0062	1.5000
		3A	0.0000	1.5000	1.4919	...	1.4675	1.4639	0.0036	1.4405	3B	1.4460	1.4537	1.4675	1.4721	0.0046	1.5000
1 1/2-28 or 1.500-28	UN	2A	0.0013	1.4987	1.4922	...	1.4755	1.4713	0.0042	1.4561	2B	1.461	1.470	1.4768	1.4823	0.0055	1.5000
		3A	0.0000	1.5000	1.4935	...	1.4768	1.4737	0.0031	1.4574	3B	1.4610	1.4676	1.4768	1.4809	0.0041	1.5000
1 9/16-6 or 1.5625-6	UN	2A	0.0024	1.5601	1.5419	...	1.4518	1.4436	0.0082	1.3617	2B	1.382	1.413	1.4542	1.4648	0.0106	1.5625
		3A	0.0000	1.5625	1.5443	...	1.4542	1.4481	0.0061	1.3641	3B	1.3820	1.4021	1.4542	1.4622	0.0080	1.5625
1 9/16-8 or 1.5625-8	UN	2A	0.0022	1.5603	1.5453	...	1.4791	1.4717	0.0074	1.4115	2B	1.427	1.452	1.4813	1.4909	0.0096	1.5625
		3A	0.0000	1.5625	1.5475	...	1.4813	1.4758	0.0055	1.4137	3B	1.4270	1.4422	1.4813	1.4885	0.0072	1.5625
1 9/16-12 or 1.5625-12	UN	2A	0.0018	1.5607	1.5493	...	1.5066	1.5007	0.0059	1.4615	2B	1.472	1.490	1.5084	1.5160	0.0076	1.5625
		3A	0.0000	1.5625	1.5511	...	1.5084	1.5040	0.0044	1.4633	3B	1.4720	1.4823	1.5084	1.5141	0.0057	1.5625
1 9/16-16 or 1.5625-16	UN	2A	0.0016	1.5609	1.5515	...	1.5203	1.5151	0.0052	1.4864	2B	1.495	1.509	1.5219	1.5287	0.0068	1.5625
		3A	0.0000	1.5625	1.5531	...	1.5219	1.5180	0.0039	1.4880	3B	1.4950	1.5033	1.5219	1.5270	0.0051	1.5625

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam.		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance	Max. (4) (Ref.)	Class	Min.	Max.	Min.	Max.	Tolerance	Min.
1⁹⁄₁₆-18 or 1.5625-18	UNEF	2A	0.0015	1.5610	1.5523	...	1.5249	1.5199	0.0050	1.4949	2B	1.502	1.515	1.5264	1.5329	0.0065	1.5625
		3A	0.0000	1.5625	1.5538	...	1.5264	1.5227	0.0037	1.4964	3B	1.5020	1.5105	1.5264	1.5312	0.0048	1.5625
1⁹⁄₁₆-20 or 1.5625-20	UN	2A	0.0014	1.5611	1.5530	...	1.5286	1.5238	0.0048	1.5016	2B	1.508	1.520	1.5300	1.5362	0.0062	1.5625
		3A	0.0000	1.5625	1.5544	...	1.5300	1.5264	0.0036	1.5030	3B	1.5080	1.5162	1.5300	1.5346	0.0046	1.5625
1⅝-6 or 1.625-6	UN	2A	0.0025	1.6225	1.6043	...	1.5142	1.5060	0.0082	1.4246	2B	1.445	1.475	1.5167	1.5274	0.0107	1.6250
		3A	0.0000	1.6250	1.6068	...	1.5167	1.5105	0.0062	1.4271	3B	1.4450	1.4646	1.5167	1.5247	0.0080	1.6250
1⅝-8 or 1.625-8	UN	2A	0.0022	1.6228	1.6078	1.6003	1.5416	1.5342	0.0074	1.4784	2B	1.490	1.515	1.5438	1.5535	0.0097	1.6250
		3A	0.0000	1.6250	1.6100	...	1.5438	1.5382	0.0056	1.4806	3B	1.4900	1.5047	1.5438	1.5510	0.0072	1.6250
1⅝-12 or 1.625-12	UN	2A	0.0018	1.6232	1.6118	...	1.5691	1.5632	0.0059	1.5240	2B	1.535	1.553	1.5709	1.5785	0.0076	1.6250
		3A	0.0000	1.6250	1.6136	...	1.5709	1.5665	0.0044	1.5258	3B	1.5350	1.5448	1.5709	1.5766	0.0057	1.6250
1⅝-16 or 1.625-16	UN	2A	0.0016	1.6234	1.6140	...	1.5828	1.5776	0.0052	1.5489	2B	1.557	1.571	1.5844	1.5912	0.0068	1.6250
		3A	0.0000	1.6250	1.6156	...	1.5844	1.5805	0.0039	1.5505	3B	1.5570	1.5658	1.5844	1.5895	0.0051	1.6250
1⅝-18 or 1.625-18	UNEF	2A	0.0015	1.6235	1.6148	...	1.5874	1.5824	0.0050	1.5574	2B	1.565	1.578	1.5889	1.5954	0.0065	1.6250
		3A	0.0000	1.6250	1.6163	...	1.5889	1.5852	0.0037	1.5589	3B	1.5650	1.5730	1.5889	1.5937	0.0048	1.6250
1⅝-20 or 1.625-20	UN	2A	0.0014	1.6236	1.6155	...	1.5911	1.5863	0.0048	1.5641	2B	1.571	1.582	1.5925	1.5987	0.0062	1.6250
		3A	0.0000	1.6250	1.6169	...	1.5925	1.5889	0.0036	1.5655	3B	1.5710	1.5787	1.5925	1.5971	0.0046	1.6250
1¹¹⁄₁₆-6 or 1.6875-6	UN	2A	0.0025	1.6850	1.6668	...	1.5767	1.5684	0.0083	1.4866	2B	1.507	1.538	1.5792	1.5900	0.0108	1.6875
		3A	0.0000	1.6875	1.6693	...	1.5792	1.5730	0.0062	1.4891	3B	1.5070	1.5271	1.5792	1.5873	0.0081	1.6875
1¹¹⁄₁₆-8 or 1.6875-8	UN	2A	0.0022	1.6853	1.6703	...	1.6041	1.5966	0.0075	1.5365	2B	1.552	1.577	1.6063	1.6160	0.0097	1.6875
		3A	0.0000	1.6875	1.6725	...	1.6063	1.6007	0.0056	1.5387	3B	1.5520	1.5672	1.6063	1.6136	0.0073	1.6875
1¹¹⁄₁₆-12 or 1.6875-12	UN	2A	0.0018	1.6857	1.6743	...	1.6316	1.6256	0.0060	1.5865	2B	1.597	1.615	1.6334	1.6412	0.0078	1.6875
		3A	0.0000	1.6875	1.6761	...	1.6334	1.6289	0.0045	1.5883	3B	1.5970	1.6073	1.6334	1.6392	0.0058	1.6875
1¹¹⁄₁₆-16 or 1.6875-16	UN	2A	0.0016	1.6859	1.6765	...	1.6453	1.6400	0.0053	1.6114	2B	1.620	1.634	1.6469	1.6538	0.0069	1.6875
		3A	0.0000	1.6875	1.6781	...	1.6469	1.6429	0.0040	1.6130	3B	1.6200	1.6283	1.6469	1.6521	0.0052	1.6875
1¹¹⁄₁₆-18 or 1.6875-18	UNEF	2A	0.0015	1.6860	1.6773	...	1.6499	1.6448	0.0051	1.6199	2B	1.627	1.640	1.6514	1.6580	0.0066	1.6875
		3A	0.0000	1.6875	1.6788	...	1.6514	1.6476	0.0038	1.6214	3B	1.6270	1.6355	1.6514	1.6563	0.0049	1.6875
1¹¹⁄₁₆-20 or 1.6875-20	UN	2A	0.0015	1.6860	1.6779	...	1.6535	1.6487	0.0048	1.6265	2B	1.633	1.645	1.6550	1.6613	0.0063	1.6875
		3A	0.0000	1.6875	1.6794	...	1.6550	1.6514	0.0036	1.6280	3B	1.6330	1.6412	1.6550	1.6597	0.0047	1.6875

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance		Class	Min.	Max.	Min.	Max.	Tolerance	Min.
1¾-5 or 1.750-5	UNC	1A	0.0027	1.7473	1.7165	...	1.6174	1.6040	0.0134	1.5092	1B	1.534	1.568	1.6201	1.6375	0.0174	1.7500
		2A	0.0027	1.7473	1.7268	1.7165	1.6174	1.6085	0.0089	1.5092	2B	1.534	1.568	1.6201	1.6317	0.0116	1.7500
		3A	0.0000	1.7500	1.7295	...	1.6201	1.6134	0.0067	1.5119	3B	1.5340	1.5575	1.6201	1.6288	0.0087	1.7500
1¾-6 or 1.750-6	UN	2A	0.0025	1.7475	1.7293	...	1.6392	1.6309	0.0083	1.5491	2B	1.570	1.600	1.6417	1.6525	0.0108	1.7500
		3A	0.0000	1.7500	1.7318	...	1.6417	1.6354	0.0063	1.5516	3B	1.5700	1.5896	1.6417	1.6498	0.0081	1.7500
1¾-8 or 1.750-8	UN	2A	0.0023	1.7477	1.7327	1.7252	1.6665	1.6590	0.0075	1.5989	2B	1.615	1.640	1.6688	1.6786	0.0098	1.7500
		3A	0.0000	1.7500	1.7350	...	1.6688	1.6632	0.0056	1.6012	3B	1.6150	1.6297	1.6688	1.6762	0.0074	1.7500
1¾-12 or 1.750-12	UN	2A	0.0018	1.7482	1.7368	...	1.6941	1.6881	0.0060	1.6490	2B	1.660	1.678	1.6959	1.7037	0.0078	1.7500
		3A	0.0000	1.7500	1.7386	...	1.6959	1.6914	0.0045	1.6508	3B	1.6600	1.6698	1.6959	1.7017	0.0058	1.7500
1¾-16 or 1.750-16	UN	2A	0.0016	1.7484	1.7390	...	1.7078	1.7025	0.0053	1.6739	2B	1.682	1.696	1.7094	1.7163	0.0069	1.7500
		3A	0.0000	1.7500	1.7406	...	1.7094	1.7054	0.0040	1.6755	3B	1.6820	1.6908	1.7094	1.7146	0.0052	1.7500
1¾-20 or 1.750-20	UN	2A	0.0015	1.7485	1.7404	...	1.7160	1.7112	0.0048	1.6890	2B	1.696	1.707	1.7175	1.7238	0.0063	1.7500
		3A	0.0000	1.7500	1.7419	...	1.7175	1.7139	0.0036	1.6905	3B	1.6960	1.7037	1.7175	1.7222	0.0047	1.7500
1 13/16-6 or 1.8125-6	UN	2A	0.0025	1.8100	1.7918	...	1.7017	1.6933	0.0084	1.6116	2B	1.632	1.663	1.7042	1.7151	0.0109	1.8125
		3A	0.0000	1.8125	1.7943	...	1.7042	1.6979	0.0063	1.6141	3B	1.6320	1.6521	1.7042	1.7124	0.0082	1.8125
1 13/16-8 or 1.8125-8	UN	2A	0.0023	1.8102	1.7952	...	1.7290	1.7214	0.0076	1.6614	2B	1.677	1.702	1.7313	1.7412	0.0099	1.8125
		3A	0.0000	1.8125	1.7975	...	1.7313	1.7256	0.0057	1.6637	3B	1.6770	1.6922	1.7313	1.7387	0.0074	1.8125
1 13/16-12 or 1.8125-12	UN	2A	0.0018	1.8107	1.7993	...	1.7566	1.7506	0.0060	1.7115	2B	1.722	1.740	1.7584	1.7662	0.0078	1.8125
		3A	0.0000	1.8125	1.8011	...	1.7584	1.7539	0.0045	1.7133	3B	1.7220	1.7323	1.7584	1.7642	0.0058	1.8125
1 13/16-16 or 1.8125-16	UN	2A	0.0016	1.8109	1.8015	...	1.7703	1.7650	0.0053	1.7364	2B	1.745	1.759	1.7719	1.7788	0.0069	1.8125
		3A	0.0000	1.8125	1.8031	...	1.7719	1.7679	0.0040	1.7380	3B	1.7450	1.7533	1.7719	1.7771	0.0052	1.8125
1 13/16-20 or 1.8125-20	UN	2A	0.0015	1.8110	1.8029	...	1.7785	1.7737	0.0048	1.7515	2B	1.758	1.770	1.7800	1.7863	0.0063	1.8125
		3A	0.0000	1.8125	1.8044	...	1.7800	1.7764	0.0036	1.7530	3B	1.7580	1.7662	1.7800	1.7847	0.0047	1.8125
1⅞-6 or 1.875-6	UN	2A	0.0025	1.8725	1.8543	...	1.7642	1.7558	0.0084	1.6741	2B	1.695	1.725	1.7667	1.7777	0.0110	1.8750
		3A	0.0000	1.8750	1.8568	...	1.7667	1.7604	0.0063	1.6766	3B	1.6950	1.7146	1.7667	1.7749	0.0082	1.8750
1⅞-8 or 1.875-8	UN	2A	0.0023	1.8727	1.8577	1.8502	1.7915	1.7838	0.0077	1.7239	2B	1.740	1.765	1.7938	1.8038	0.0100	1.8750
		3A	0.0000	1.8750	1.8600	...	1.7938	1.7881	0.0057	1.7262	3B	1.7400	1.7547	1.7938	1.8013	0.0075	1.8750
1⅞-12 or 1.875-12	UN	2A	0.0018	1.8732	1.8618	...	1.8191	1.8131	0.0060	1.7740	2B	1.785	1.803	1.8209	1.8287	0.0078	1.8750
		3A	0.0000	1.8750	1.8636	...	1.8209	1.8164	0.0045	1.7758	3B	1.7850	1.7948	1.8209	1.8267	0.0058	1.8750

(Notes follow at end of table)

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)								Internal (1)						
				Major Diameter			Pitch Diameter		UNR Minor Diam. Max. (4) (Ref.)		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allow-ance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Toler-ance		Class	Min.	Max.	Min.	Max.	Toler-ance	Min.
1⅞-16 or 1.875-16	UN	2A	0.0016	1.8734	1.8640	...	1.8328	1.8275	0.0053	1.7989	2B	1.807	1.821	1.8344	1.8413	0.0069	1.8750
		3A	0.0000	1.8750	1.8656	...	1.8344	1.8304	0.0040	1.8005	3B	1.8070	1.8158	1.8344	1.8396	0.0052	1.8750
1⅞-20 or 1.875-20	UN	2A	0.0015	1.8735	1.8654	...	1.8410	1.8362	0.0048	1.8140	2B	1.821	1.832	1.8425	1.8488	0.0063	1.8750
		3A	0.0000	1.8750	1.8669	...	1.8425	1.8389	0.0036	1.8155	3B	1.8210	1.8287	1.8425	1.8472	0.0047	1.8750
1 15/16-6 or 1.9375-6	UN	2A	0.0026	1.9349	1.9167	...	1.8266	1.8181	0.0085	1.7365	2B	1.757	1.788	1.8292	1.8403	0.0111	1.9375
		3A	0.0000	1.9375	1.9193	...	1.8292	1.8228	0.0064	1.7391	3B	1.7570	1.7771	1.8292	1.8375	0.0083	1.9375
1 15/16-8 or 1.9375-8	UN	2A	0.0023	1.9352	1.9202	...	1.8540	1.8463	0.0077	1.7864	2B	1.802	1.827	1.8563	1.8663	0.0100	1.9375
		3A	0.0000	1.9375	1.9225	...	1.8563	1.8505	0.0058	1.7887	3B	1.8020	1.8172	1.8563	1.8638	0.0075	1.9375
1 15/16-12 or 1.9375-12	UN	2A	0.0018	1.9357	1.9243	...	1.8816	1.8755	0.0061	1.8365	2B	1.847	1.865	1.8834	1.8913	0.0079	1.9375
		3A	0.0000	1.9375	1.9261	...	1.8834	1.8789	0.0045	1.8383	3B	1.8470	1.8573	1.8834	1.8893	0.0059	1.9375
1 15/16-16 or 1.9375-16	UN	2A	0.0016	1.9359	1.9265	...	1.8953	1.8899	0.0054	1.8614	2B	1.870	1.884	1.8969	1.9039	0.0070	1.9375
		3A	0.0000	1.9375	1.9281	...	1.8969	1.8929	0.0040	1.8630	3B	1.8700	1.8783	1.8969	1.9021	0.0052	1.9375
1 15/16-20 or 1.9375-20	UN	2A	0.0015	1.9360	1.9279	...	1.9035	1.8986	0.0049	1.8765	2B	1.883	1.895	1.9050	1.9114	0.0064	1.9375
		3A	0.0000	1.9375	1.9294	...	1.9050	1.9013	0.0037	1.8780	3B	1.8830	1.8912	1.9050	1.9098	0.0048	1.9375
2-4½ or 2.000-4.5	UNC	1A	0.0029	1.9971	1.9641	...	1.8528	1.8385	0.0143	1.7324	1B	1.759	1.795	1.8557	1.8743	0.0186	2.0000
		2A	0.0029	1.9971	1.9751	1.9641	1.8528	1.8433	0.0095	1.7324	2B	1.759	1.795	1.8557	1.8681	0.0124	2.0000
		3A	0.0000	2.0000	1.9780	...	1.8557	1.8486	0.0071	1.7353	3B	1.7590	1.7861	1.8557	1.8650	0.0093	2.0000
2-6 or 2.000-6	UN	2A	0.0026	1.9974	1.9792	...	1.8891	1.8805	0.0086	1.7990	2B	1.820	1.850	1.8917	1.9028	0.0111	2.0000
		3A	0.0000	2.0000	1.9818	...	1.8917	1.8853	0.0064	1.8016	3B	1.8200	1.8396	1.8917	1.9000	0.0083	2.0000
2-8 or 2.000-8	UN	2A	0.0023	1.9977	1.9827	1.9752	1.9165	1.9087	0.0078	1.8489	2B	1.865	1.890	1.9188	1.9289	0.0101	2.0000
		3A	0.0000	2.0000	1.9850	...	1.9188	1.9130	0.0058	1.8512	3B	1.8650	1.8797	1.9188	1.9264	0.0076	2.0000
2-12 or 2.000-12	UN	2A	0.0018	1.9982	1.9868	...	1.9441	1.9380	0.0061	1.8990	2B	1.910	1.928	1.9459	1.9538	0.0079	2.0000
		3A	0.0000	2.0000	1.9886	...	1.9459	1.9414	0.0045	1.9008	3B	1.9100	1.9198	1.9459	1.9518	0.0059	2.0000
2-16 or 2.000-16	UN	2A	0.0016	1.9984	1.9890	...	1.9578	1.9524	0.0054	1.9239	2B	1.932	1.946	1.9594	1.9664	0.0070	2.0000
		3A	0.0000	2.0000	1.9906	...	1.9594	1.9554	0.0040	1.9255	3B	1.9320	1.9408	1.9594	1.9646	0.0052	2.0000
2-20 or 2.000-20	UN	2A	0.0015	1.9985	1.9904	...	1.9660	1.9611	0.0049	1.9390	2B	1.946	1.957	1.9675	1.9739	0.0064	2.0000
		3A	0.0000	2.0000	1.9919	...	1.9675	1.9638	0.0037	1.9405	3B	1.9460	1.9537	1.9675	1.9723	0.0048	2.0000
2⅛-6 or 2.125-6	UN	2A	0.0026	2.1224	2.1042	...	2.0141	2.0054	0.0087	1.9240	2B	1.945	1.975	2.0167	2.0280	0.0113	2.1250
		3A	0.0000	2.1250	2.1068	...	2.0167	2.0102	0.0065	1.9266	3B	1.9450	1.9646	2.0167	2.0251	0.0084	2.1250

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TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
		Class	Allowance	Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)	Class	Minor Diameter		Pitch Diameter			Major Diameter
				Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance			Min.	Max.	Min.	Max.	Tolerance	Min.
2⅛-8 or 2.125-8	UN	2A	0.0024	2.1226	2.1076	2.1001	2.0414	2.0335	0.0079	1.9738	2B	1.990	2.015	2.0438	2.0540	0.0102	2.1250
		3A	0.0000	2.1250	2.1100	...	2.0438	2.0379	0.0059	1.9762	3B	1.9900	2.0047	2.0438	2.0515	0.0077	2.1250
2⅛-12 or 2.125-12	UN	2A	0.0018	2.1232	2.1118	...	2.0691	2.0630	0.0061	2.0240	2B	2.035	2.053	2.0709	2.0788	0.0079	2.1250
		3A	0.0000	2.1250	2.1136	...	2.0709	2.0664	0.0045	2.0258	3B	2.0350	2.0448	2.0709	2.0768	0.0059	2.1250
2⅛-16 or 2.125-16	UN	2A	0.0016	2.1234	2.1140	...	2.0828	2.0774	0.0054	2.0489	2B	2.057	2.071	2.0844	2.0914	0.0070	2.1250
		3A	0.0000	2.1250	2.1156	...	2.0844	2.0803	0.0041	2.0505	3B	2.0570	2.0658	2.0844	2.0896	0.0052	2.1250
2⅛-20 or 2.125-20	UN	2A	0.0015	2.1235	2.1154	...	2.0910	2.0861	0.0049	2.0640	2B	2.071	2.082	2.0925	2.0989	0.0064	2.1250
		3A	0.0000	2.1250	2.1169	...	2.0925	2.0888	0.0037	2.0655	3B	2.0710	2.0787	2.0925	2.0973	0.0048	2.1250
2¼-4½ or 2.250-4.5	UNC	1A	0.0029	2.2471	2.2141	...	2.1028	2.0882	0.0146	1.9824	1B	2.009	2.045	2.1057	2.1247	0.0190	2.2500
		2A	0.0029	2.2471	2.2251	2.2141	2.1028	2.0931	0.0097	1.9824	2B	2.009	2.045	2.1057	2.1183	0.0126	2.2500
		3A	0.0000	2.2500	2.2280	...	2.1057	2.0984	0.0073	1.9853	3B	2.0090	2.0361	2.1057	2.1152	0.0095	2.2500
2¼-6 or 2.250-6	UN	2A	0.0026	2.2474	2.2292	...	2.1391	2.1303	0.0088	2.0490	2B	2.070	2.100	2.1417	2.1531	0.0114	2.2500
		3A	0.0000	2.2500	2.2318	...	2.1417	2.1351	0.0066	2.0516	3B	2.0700	2.0896	2.1417	2.1502	0.0085	2.2500
2¼-8 or 2.250-8	UN	2A	0.0024	2.2476	2.2326	2.2251	2.1664	2.1584	0.0080	2.0988	2B	2.115	2.140	2.1688	2.1792	0.0104	2.2500
		3A	0.0000	2.2500	2.2350	...	2.1688	2.1628	0.0060	2.1012	3B	2.1150	2.1297	2.1688	2.1766	0.0078	2.2500
2¼-12 or 2.250-12	UN	2A	0.0018	2.2482	2.2368	...	2.1941	2.1880	0.0061	2.1490	2B	2.160	2.178	2.1959	2.2038	0.0079	2.2500
		3A	0.0000	2.2500	2.2386	...	2.1959	2.1914	0.0045	2.1508	3B	2.1600	2.1698	2.1959	2.2018	0.0059	2.2500
2¼-16 or 2.250-16	UN	2A	0.0016	2.2484	2.2390	...	2.2078	2.2024	0.0054	2.1739	2B	2.182	2.196	2.2094	2.2164	0.0070	2.2500
		3A	0.0000	2.2500	2.2406	...	2.2094	2.2053	0.0041	2.1755	3B	2.1820	2.1908	2.2094	2.2146	0.0052	2.2500
2¼-20 or 2.250-20	UN	2A	0.0015	2.2485	2.2404	...	2.2160	2.2111	0.0049	2.1890	2B	2.196	2.207	2.2175	2.2239	0.0064	2.2500
		3A	0.0000	2.2500	2.2419	...	2.2175	2.2137	0.0038	2.1905	3B	2.1960	2.2037	2.2175	2.2223	0.0048	2.2500
2⅜-6 or 2.375-6	UN	2A	0.0027	2.3723	2.3541	...	2.2640	2.2551	0.0089	2.1739	2B	2.195	2.226	2.2667	2.2782	0.0115	2.3750
		3A	0.0000	2.3750	2.3568	...	2.2667	2.2601	0.0066	2.1766	3B	2.1950	2.2146	2.2667	2.2753	0.0086	2.3750
2⅜-8 or 2.375-8	UN	2A	0.0024	2.3726	2.3576	...	2.2914	2.2833	0.0081	2.2238	2B	2.240	2.265	2.2938	2.3043	0.0105	2.3750
		3A	0.0000	2.3750	2.3600	...	2.2938	2.2878	0.0060	2.2262	3B	2.2400	2.2547	2.2938	2.3017	0.0079	2.3750
2⅜-12 or 2.375-12	UN	2A	0.0019	2.3731	2.3617	...	2.3190	2.3128	0.0062	2.2739	2B	2.285	2.303	2.3209	2.3290	0.0081	2.3750
		3A	0.0000	2.3750	2.3636	...	2.3209	2.3163	0.0046	2.2758	3B	2.2850	2.2948	2.3209	2.3269	0.0060	2.3750
2⅜-16 or 2.375-16	UN	2A	0.0017	2.3733	2.3639	...	2.3327	2.3272	0.0055	2.2988	2B	2.307	2.321	2.3344	2.3416	0.0072	2.3750
		3A	0.0000	2.3750	2.3656	...	2.3344	2.3303	0.0041	2.3005	3B	2.3070	2.3158	2.3344	2.3398	0.0054	2.3750

(Notes follow at end of table)

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ASME B1.1 89 ■ 0759670 0039739 4 ■

TABLE 3A LIMITS OF SIZE FOR STANDARD SERIES THREADS (UN/UNR) (CONT'D)

Nominal Size and Threads/in.	Series Designation	External (1)									Internal (1)						
				Major Diameter			Pitch Diameter			UNR Minor Diam. Max. (4) (Ref.)		Minor Diameter		Pitch Diameter			Major Diameter
		Class	Allowance	Max. (2)	Min.	Min. (3)	Max. (2)	Min.	Tolerance		Class	Min.	Max.	Min.	Max.	Tolerance	Min.
2⅜-20 or 2.375-20	UN	2A	0.0015	2.3735	2.3654	. . .	2.3410	2.3359	0.0051	2.3140	2B	2.321	2.332	2.3425	2.3491	0.0066	2.3750
		3A	0.0000	2.3750	2.3669	. . .	2.3425	2.3387	0.0038	2.3155	3B	2.3210	2.3287	2.3425	2.3475	0.0050	2.3750
2½-4 or 2.500-4	UNC	1A	0.0031	2.4969	2.4612	. . .	2.3345	2.3190	0.0155	2.1992	1B	2.229	2.267	2.3376	2.3578	0.0202	2.5000
		2A	0.0031	2.4969	2.4731	2.4612	2.3345	2.3241	0.0104	2.1992	2B	2.229	2.267	2.3376	2.3511	0.0135	2.5000
		3A	0.0000	2.5000	2.4762	. . .	2.3376	2.3298	0.0078	2.2023	3B	2.2290	2.2594	2.3376	2.3477	0.0101	2.5000
2½-6 or 2.500-6	UN	2A	0.0027	2.4973	2.4791	. . .	2.3890	2.3800	0.0090	2.2989	2B	2.320	2.350	2.3917	2.4033	0.0116	2.5000
		3A	0.0000	2.5000	2.4818	. . .	2.3917	2.3850	0.0067	2.3016	3B	2.3200	2.3396	2.3917	2.4004	0.0087	2.5000
2½-8 or 2.500-8	UN	2A	0.0024	2.4976	2.4826	2.4751	2.4164	2.4082	0.0082	2.3488	2B	2.365	2.390	2.4188	2.4294	0.0106	2.5000
		3A	0.0000	2.5000	2.4850	. . .	2.4188	2.4127	0.0061	2.3512	3B	2.3650	2.3797	2.4188	2.4268	0.0080	2.5000
2½-12 or 2.500-12	UN	2A	0.0019	2.4981	2.4867	. . .	2.4440	2.4378	0.0062	2.3989	2B	2.410	2.428	2.4459	2.4540	0.0081	2.5000
		3A	0.0000	2.5000	2.4886	. . .	2.4459	2.4413	0.0046	2.4008	3B	2.4100	2.4198	2.4459	2.4519	0.0060	2.5000
2½-16 or 2.500-16	UN	2A	0.0017	2.4983	2.4889	. . .	2.4577	2.4522	0.0055	2.4238	2B	2.432	2.446	2.4594	2.4666	0.0072	2.5000
		3A	0.0000	2.5000	2.4906	. . .	2.4594	2.4553	0.0041	2.4255	3B	2.4320	2.4408	2.4594	2.4648	0.0054	2.5000
2½-20 or 2.500-20	UN	2A	0.0015	2.4985	2.4904	. . .	2.4660	2.4609	0.0051	2.4390	2B	2.446	2.457	2.4675	2.4741	0.0066	2.5000
		3A	0.0000	2.5000	2.4919	. . .	2.4675	2.4637	0.0038	2.4405	3B	2.4460	2.4537	2.4675	2.4725	0.0050	2.5000
2⅝-6 or 2.625-6	UN	2A	0.0027	2.6223	2.6041	. . .	2.5140	2.5050	0.0090	2.4239	2B	2.445	2.475	2.5167	2.5285	0.0118	2.6250
		3A	0.0000	2.6250	2.6068	. . .	2.5167	2.5099	0.0068	2.4266	3B	2.4450	2.4646	2.5167	2.5255	0.0088	2.6250
2⅝-8 or 2.625-8	UN	2A	0.0025	2.6225	2.6075	. . .	2.5413	2.5331	0.0082	2.4737	2B	2.490	2.515	2.5438	2.5545	0.0107	2.6250
		3A	0.0000	2.6250	2.6100	. . .	2.5438	2.5376	0.0062	2.4762	3B	2.4900	2.5047	2.5438	2.5518	0.0080	2.6250
2⅝-12 or 2.625-12	UN	2A	0.0019	2.6231	2.6117	. . .	2.5690	2.5628	0.0062	2.5239	2B	2.535	2.553	2.5709	2.5790	0.0081	2.6250
		3A	0.0000	2.6250	2.6136	. . .	2.5709	2.5663	0.0046	2.5258	3B	2.5350	2.5448	2.5709	2.5769	0.0060	2.6250
2⅝-16 or 2.625-16	UN	2A	0.0017	2.6233	2.6139	. . .	2.5827	2.5772	0.0055	2.5488	2B	2.557	2.571	2.5844	2.5916	0.0072	2.6250
		3A	0.0000	2.6250	2.6156	. . .	2.5844	2.5803	0.0041	2.5505	3B	2.5570	2.5658	2.5844	2.5898	0.0054	2.6250
2⅝-20 or 2.625-20	UN	2A	0.0015	2.6235	2.6154	. . .	2.5910	2.5859	0.0051	2.5640	2B	2.571	2.582	2.5925	2.5991	0.0066	2.6250
		3A	0.0000	2.6250	2.6169	. . .	2.5925	2.5887	0.0038	2.5655	3B	2.5710	2.5787	2.5925	2.5975	0.0050	2.6250
2¾-4 or 2.750-4	UNC	1A	0.0032	2.7468	2.7111	. . .	2.5844	2.5686	0.0158	2.4491	1B	2.479	2.517	2.5876	2.6082	0.0206	2.7500
		2A	0.0032	2.7468	2.7230	2.7111	2.5844	2.5739	0.0105	2.4491	2B	2.479	2.517	2.5876	2.6013	0.0137	2.7500
		3A	0.0000	2.7500	2.7262	. . .	2.5876	2.5797	0.0079	2.4523	3B	2.4790	2.5094	2.5876	2.5979	0.0103	2.7500
2¾-6 or 2.750-6	UN	2A	0.0027	2.7473	2.7291	. . .	2.6390	2.6299	0.0091	2.5489	2B	2.570	2.600	2.6417	2.6536	0.0119	2.7500
		3A	0.0000	2.7500	2.7318	. . .	2.6417	2.6349	0.0068	2.5516	3B	2.5700	2.5896	2.6417	2.6506	0.0089	2.7500

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