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

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

AN AMERICAN NATIONAL STANDARD

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The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

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The American Society of Mechanical Engineers
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FOREWORD

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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Standardization and Unification of Screw Threads

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

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This Standard is always open for comment, and the Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

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

1 GENERAL

1.1 Scope

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

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

1.2 Unified Screw Thread Standards

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

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

1.3 Thread Forms

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

The UNJ screw thread is designed for use on highly stressed applications requiring high-fatigue strength. For aerospace applications, only Classes 3A and 3B should be used. Basic thread height is only $0.48713929P$ to permit a root radius larger than that of the UN and UNR forms.

1.4 Interchangeability

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

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

1.5 Designations

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

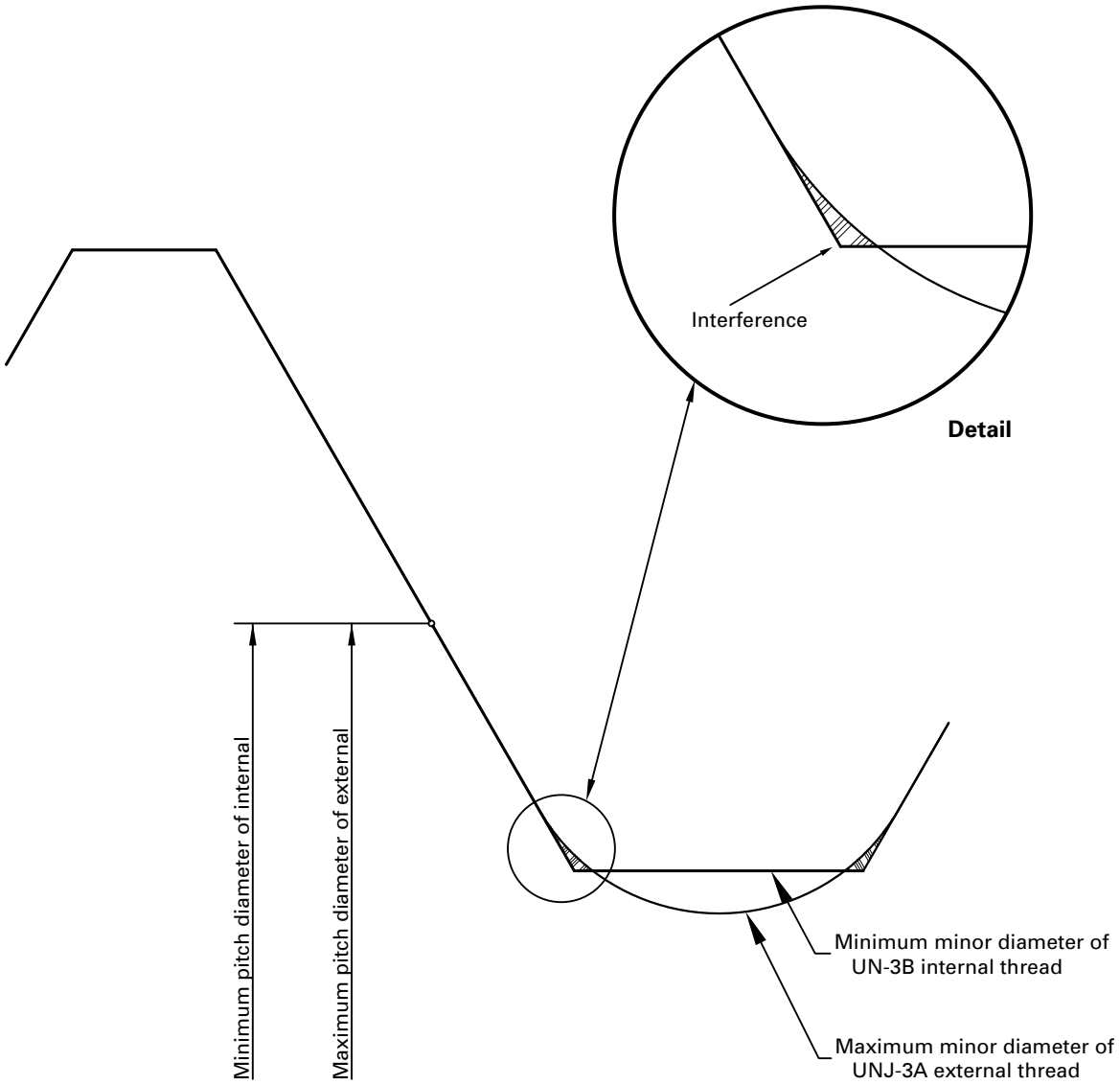
1.6 References

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

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

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

Figure 1 Illustration of Assembly Interference of UNJ-3A Thread and UN-3B Thread in the Maximum Material Condition



ASME B1.7, Screw Threads: Nomenclature, Definitions, and Letter Symbols
ASME B1.30, Screw Threads: Standard Practice for Calculating and Rounding Dimensions
ASME B47.1, Gage Blanks
ASME B94.11M, Twist Drills
ASME Y14.5, Dimensioning and Tolerancing
Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)

ISO 68, General Purpose Screw Threads — Basic Profile
Publisher: International Organization for Standardization (ISO), Central Secretariat, Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland (www.iso.org)

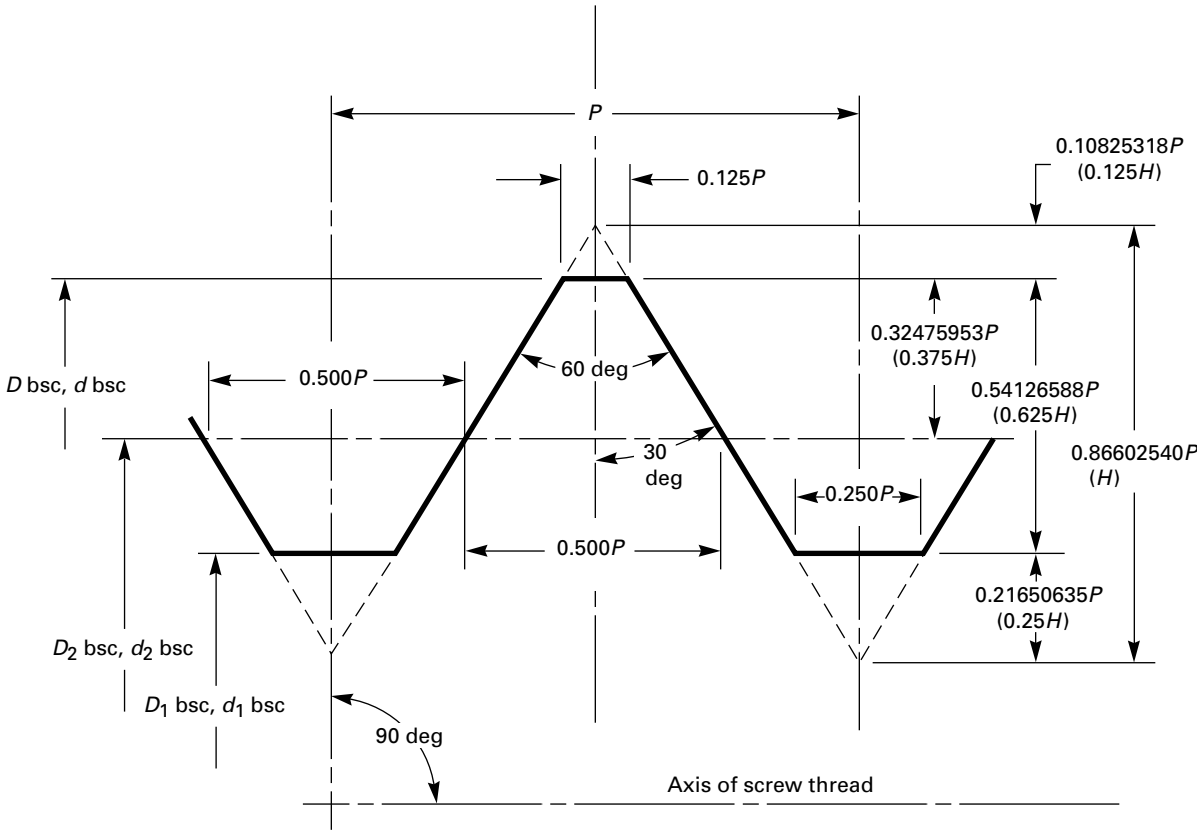
1.7 Acceptability

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

1.8 Reference Temperature

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

Figure 2 Basic Profile for UN and UNR Screw Threads



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, para. 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

2.2.1 UN and UNR. The basic profile for UN screw threads is identical to that for UNR screw threads and is shown in Figure 2. 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.

2.2.2 UNJ. The basic profile for UNJ screw threads is shown in Figure 3. It is the theoretical profile corresponding to the basic dimensions of the thread major diameter, pitch diameter, and minor diameter. This profile includes a 0.15011107P to 0.18042196P radius at the root of the external thread as shown in Figure 4. This also requires that the minor diameter of the external and internal threads be larger than the UN and UNR thread forms to accommodate the external thread maximum root radius. It is similar to but not the same as the profile for UN and UNR.

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.

Figure 3 Basic Profile for UNJ Screw Threads

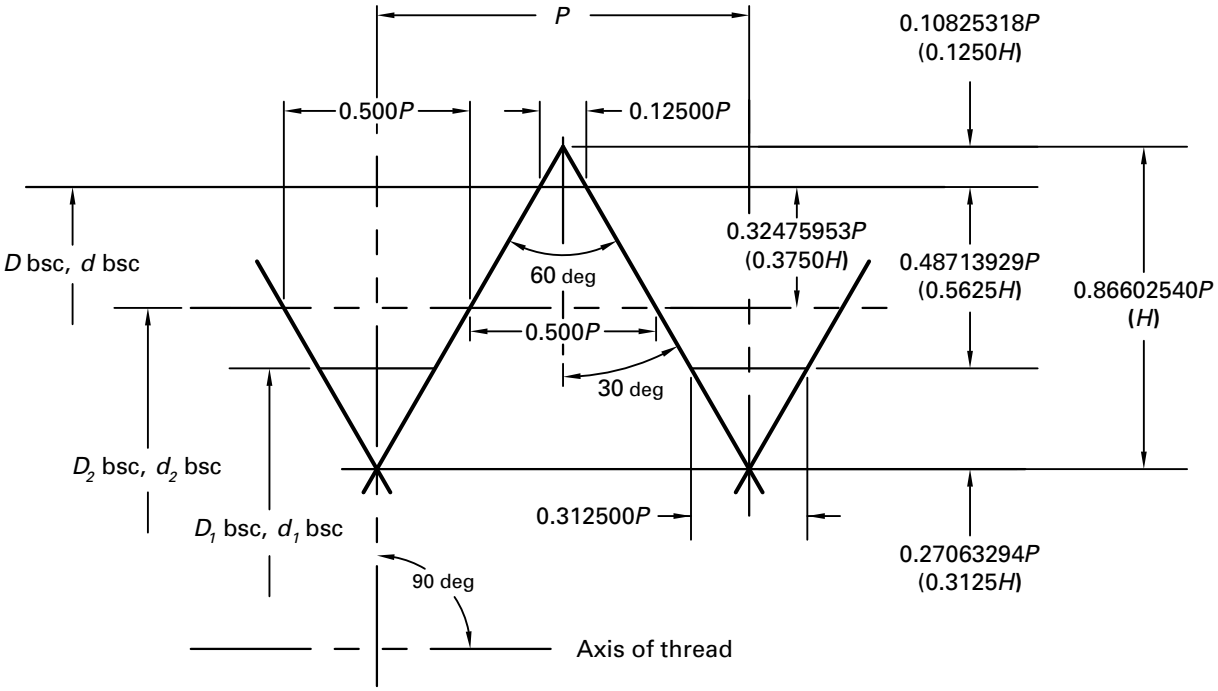
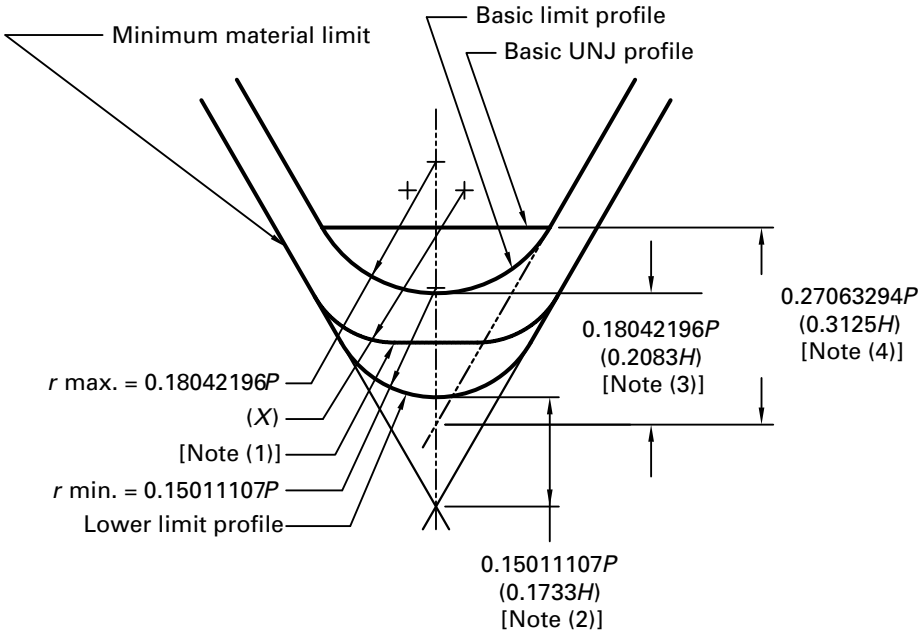


Figure 4 Root Radius of UNJ External Thread



NOTES:
(1) Optional profile comprised of two circular arcs (*X*) tangential to the flanks and flat at the root.
(2) Minimum truncation.
(3) Maximum truncation.
(4) Tangent flank radii (minor diameter).

2.3.1 Design Profiles of External Threads

2.3.1.1 UN and UNR. The design profiles of external UN and UNR screw threads are included in Figures 5 through 8. 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 0.2500*P* 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) At the least material condition (LMC), the root form of the UNR external thread shall be a full root radius of not less than 0.10825318*P*. At maximum material condition (MMC), the root form of the UNR external thread may be one of the following types:

(1) a full root radius of not more than 0.14433757*P*, which makes the point of tangency between the radius and the flanks at a point 0.54126588*P* below the basic major diameter (the equivalent of a 0.2500*P* width of flat).

(2) a "rounded form" consisting of a combination of flats and radii not less than 0.10825318*P*, as shown in Figures 7 and 8. When the root is the rounded form, the radii may exceed 0.14433757*P* so long as the point of tangency between the radii and the flanks is no less than 0.54126588*P* below the basic major diameter (the equivalent of a 0.2500*P* width of flat).

(b) The design profiles of external UN and UNR screw threads have flat crests. However, in practice, product thread crests may be flat, partially rounded, or fully rounded. A rounded crest tangent at a 0.12500*P* flat is shown as an option in Figures 5 through 8.

2.3.1.2 UNJ. The design profile of the external UNJ screw thread specifies that the actual root of the thread shall lie within the root radius tolerance zone shown in Figures 4 and 9. The limit dimensions of the root radius, *r*, are shown in Figures 10 and 11 and their values are specified in Table 2A. The profile shall be a continuous smoothly blended non-reversing curve, no part of which shall have a radius of less than 0.15011107*P* and which is tangent to the thread flanks at not less than 0.48713929*P* basic thread depth. The profile may comprise tangent flank circular arcs that are tangent to the flanks and a flat at the minor diameter provided that the minor diameter, d_3, is within the zone established in Figures 10 and 11. Unless otherwise specified, the runout or incomplete UNJ threads on externally threaded parts shall be no less than 1 pitch nor more than 2 pitches in length. The threads shall runout onto the shank without any abrupt change in cross-sectional area. The root radius shall be no less than the minimum radius of the full thread section.

2.3.2 Design Profile of Internal Threads. The design profiles of the internal UN and UNJ screw threads are included in Figures 2, 5 through 8, and 10 through 12 (there is no internal UNR screw thread). In practice, it is necessary to provide for some threading tool crest wear resulting in a profile that may be flat or partially or fully rounded; therefore, the root of the design profile is rounded and cleared beyond the 0.12500*P* flat width of the basic profile. No root radius is specified.

2.4 Formulas and Nomenclature

The formulas and nomenclature 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 1. Limits of size are shown in Tables 2A and 2B and discussed in section 8.

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, UNJS, or UNRS. If allowance and tolerance are not derived from unified formulation, the threads are designated "SPL 60-deg Form." (See para. 6.1 and Figure 13 for details of designation.)

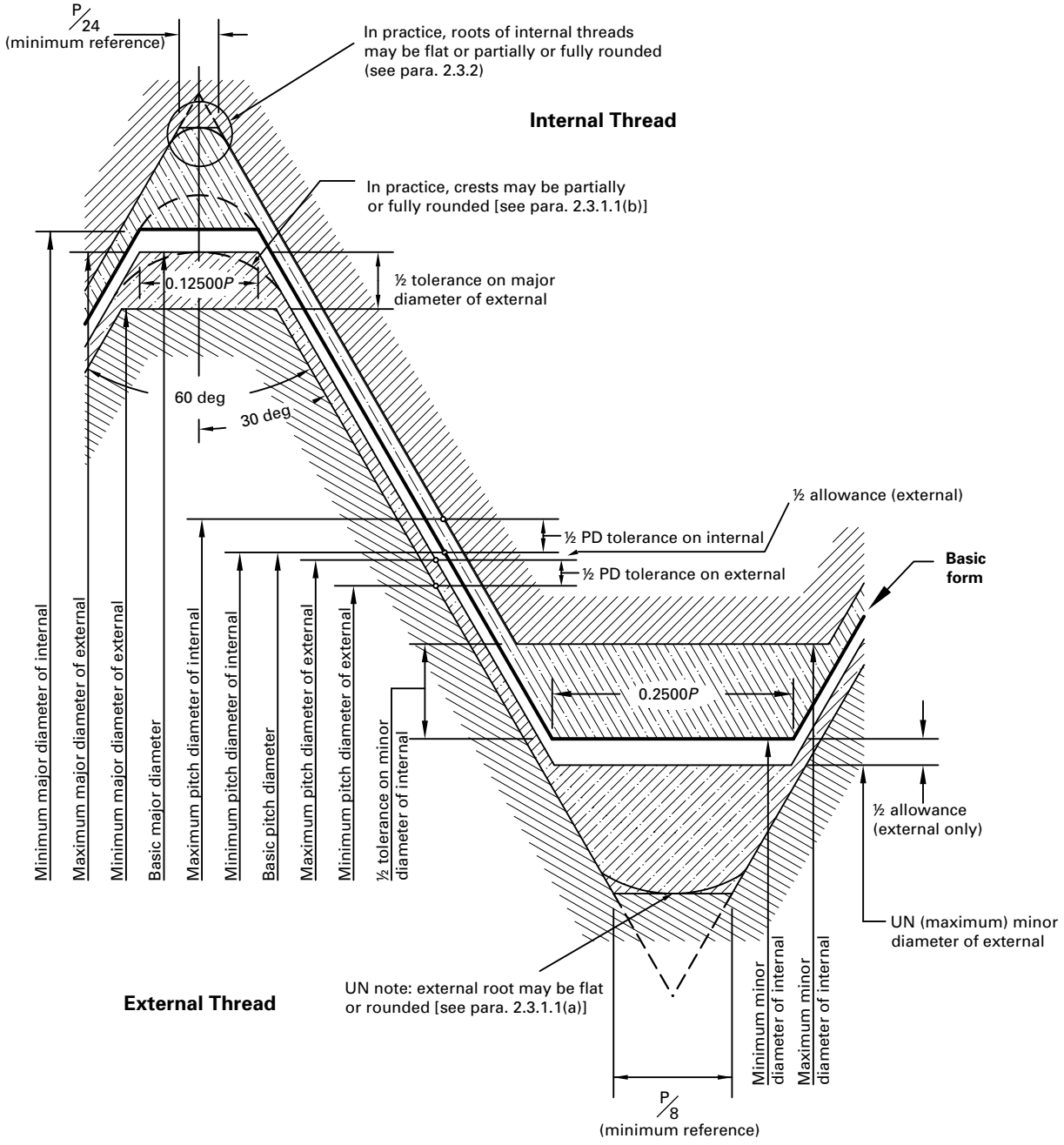
3.2 Order of Selection

Wherever possible, selection should be made from Table 1, preference being given to the coarse- and fine-thread series. As second choice, if the threads in the standard series in Table 1 do not meet the requirements of the design, special thread sizes should be selected from Table E-1 and their limits calculated using the formulas in section 8. The limits in Table D-1 are for reference only and are not recommended for new applications.

3.3 Coarse-Thread Series Applications

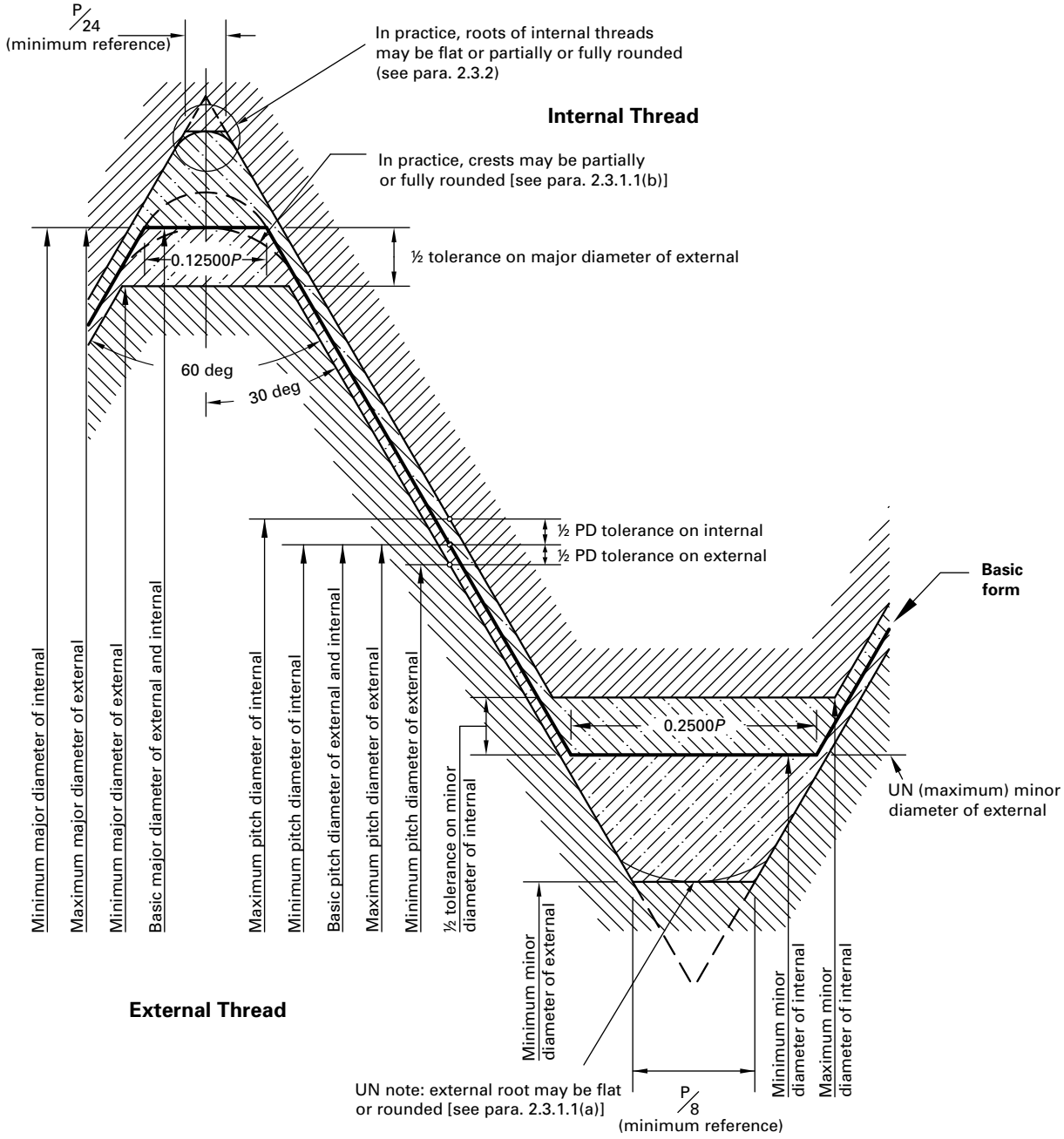
The coarse-thread series (UNC, UNRC, or UNJC) is generally used for the bulk production of screws, bolts, and nuts. It is commonly used in materials such as cast iron, aluminum, magnesium, brass, bronze, and plastic, because the coarse-thread series provides more resistance to internal thread stripping than the fine- or extra-fine-thread series. The coarse-thread series is advantageous where rapid assembly or disassembly is

Figure 5 Disposition of Diametral Tolerances, Allowance, and Crest Clearance for Unified Inch Screw Thread Series UN, Classes 1A, 2A, 1B, and 2B



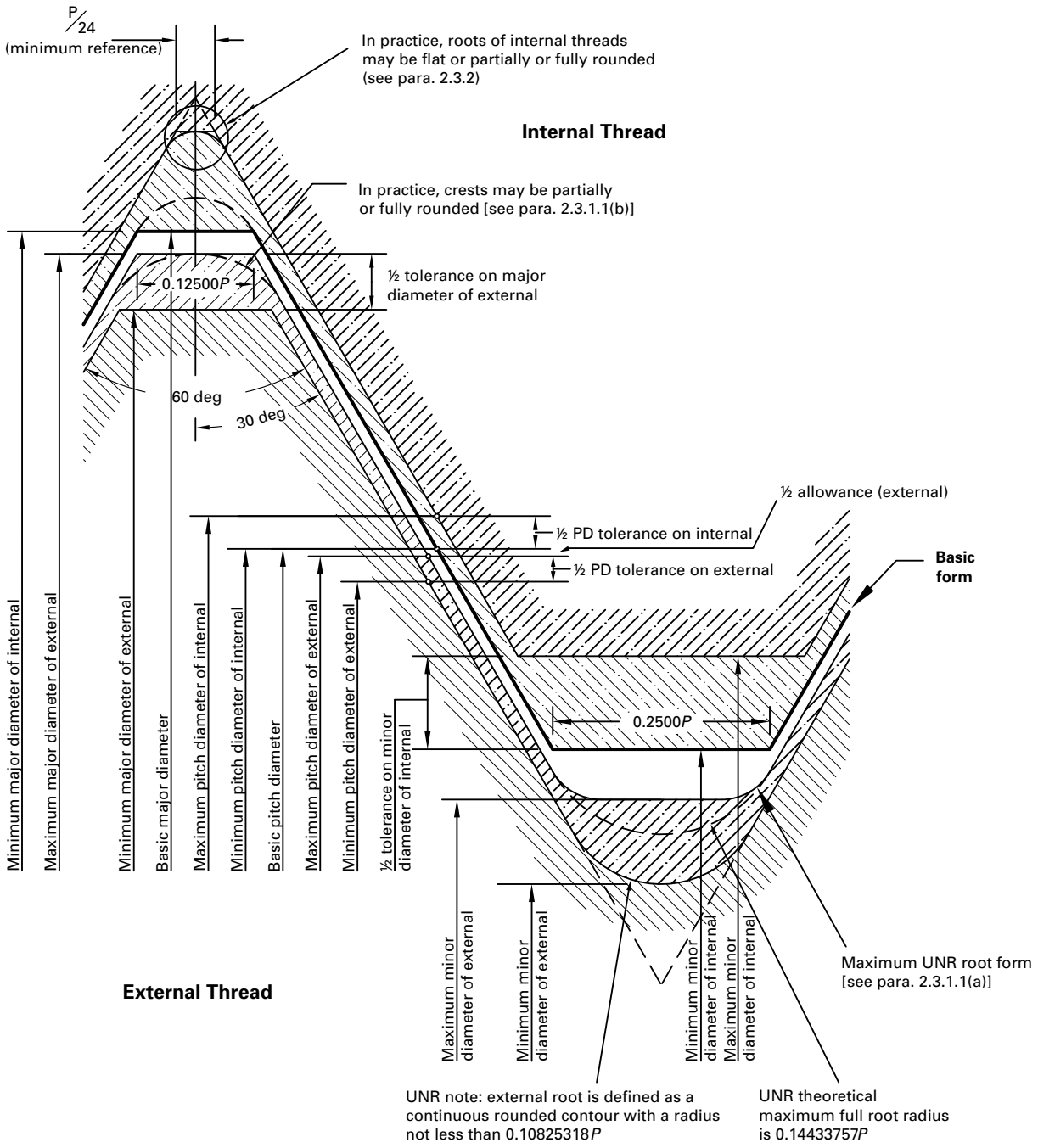
GENERAL NOTE: Lead and angle tolerances are defined in section 9.

Figure 6 Disposition of Diametral Tolerances and Crest Clearance for Unified Inch Screw Thread Series UN, Classes 3A and 3B



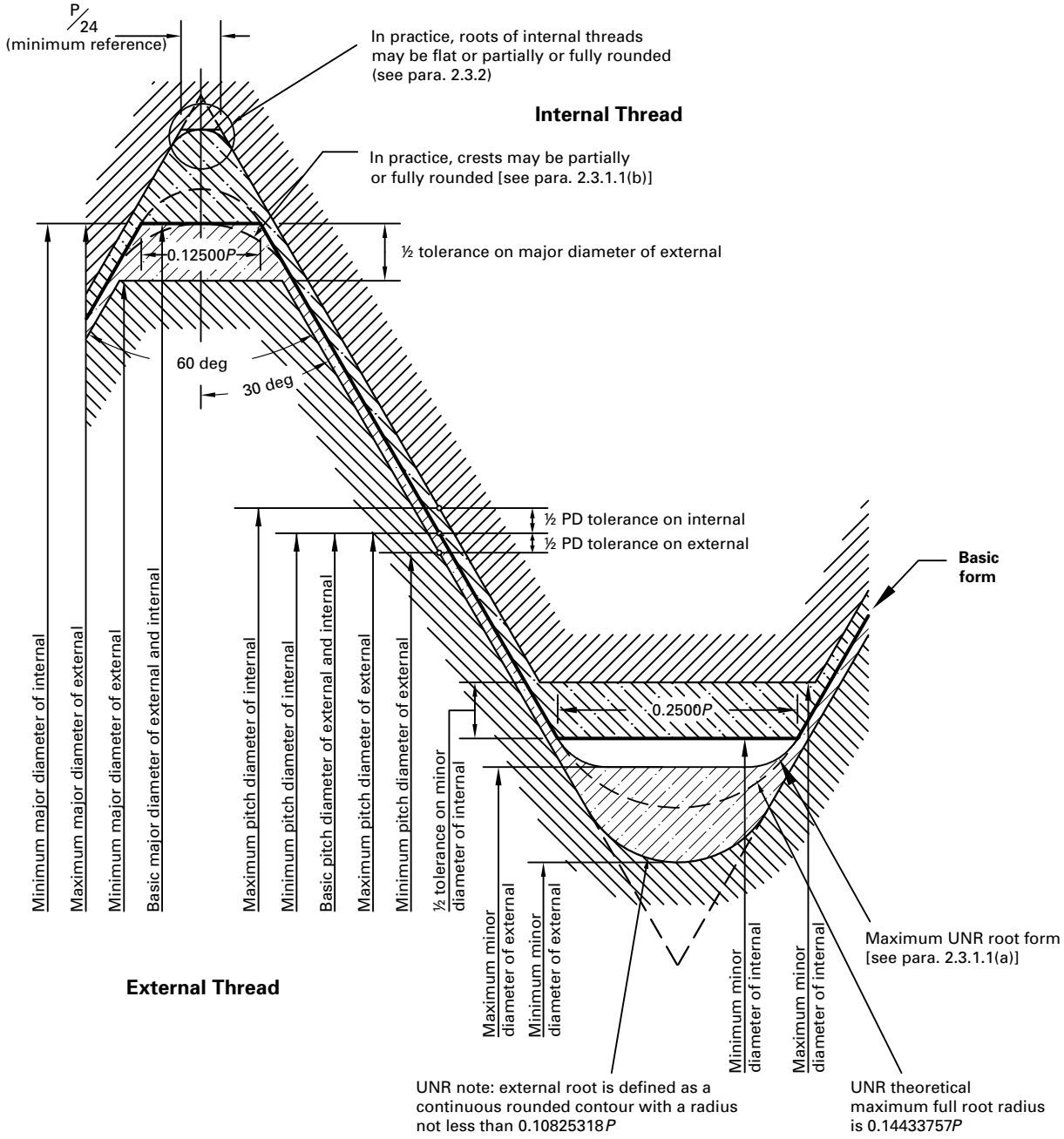
GENERAL NOTE: Lead and angle tolerances are defined in section 9.

Figure 7 Disposition of Diametral Tolerances, Allowance, and Crest Clearance for Unified Inch Screw Thread Series UNR, Classes 1A and 2A, and Series UN, Classes 1B and 2B



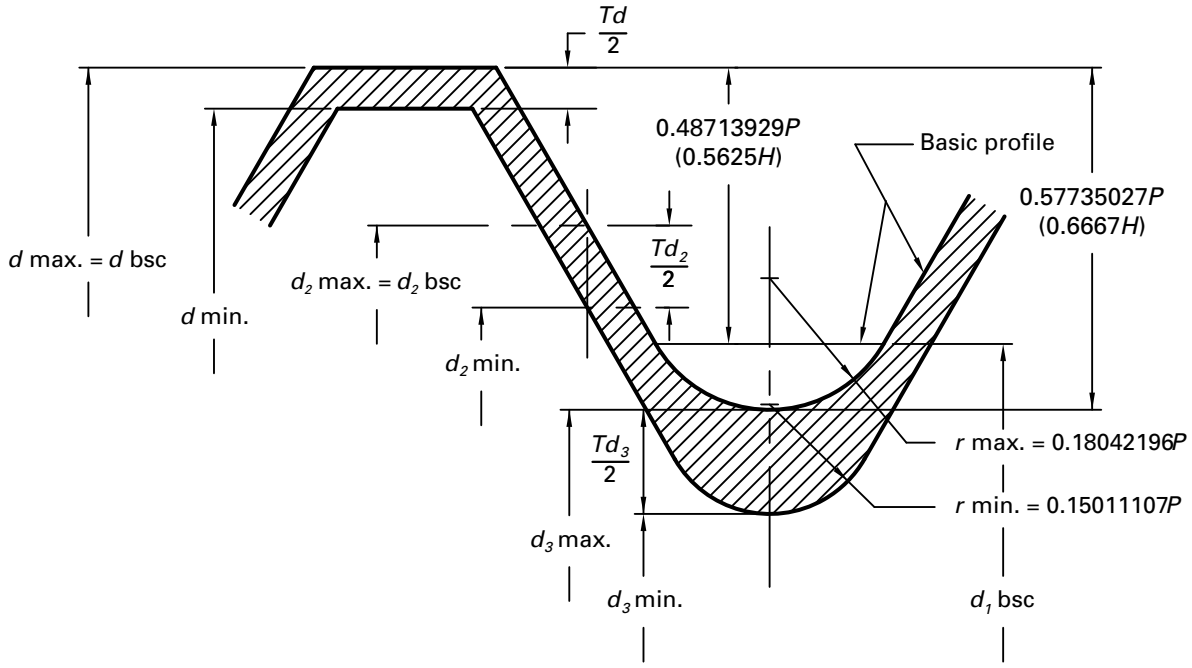
GENERAL NOTE: Lead and angle tolerances are defined in section 9.

Figure 8 Disposition of Diametral Tolerances and Crest Clearance for Unified Inch Screw Thread Series UNR, Class 3A and Series UN, Class 3B



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

Figure 9 External UNJ Thread Design Profile and Tolerances



GENERAL NOTE: Rounded crest is optional (see para. 7.1.2.2).

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, or UNJF) is commonly used for bolts and nuts in high-strength applications. This series has less thread depth and a larger minor diameter than the coarse-thread series. Consequently, thinner walls are permitted for internal threads and more strength is available to external threads than for coarse-thread series of the same nominal size. In order to prevent internal thread stripping, a longer length of engagement is required for fine-thread series than for coarse-thread series for thread materials of the same strength levels. However, for both fine- and coarse-thread series, length of engagement in tapped holes must be selected to meet strength requirements. 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-thread series (UNEF, UNREF, or UNJEF) 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

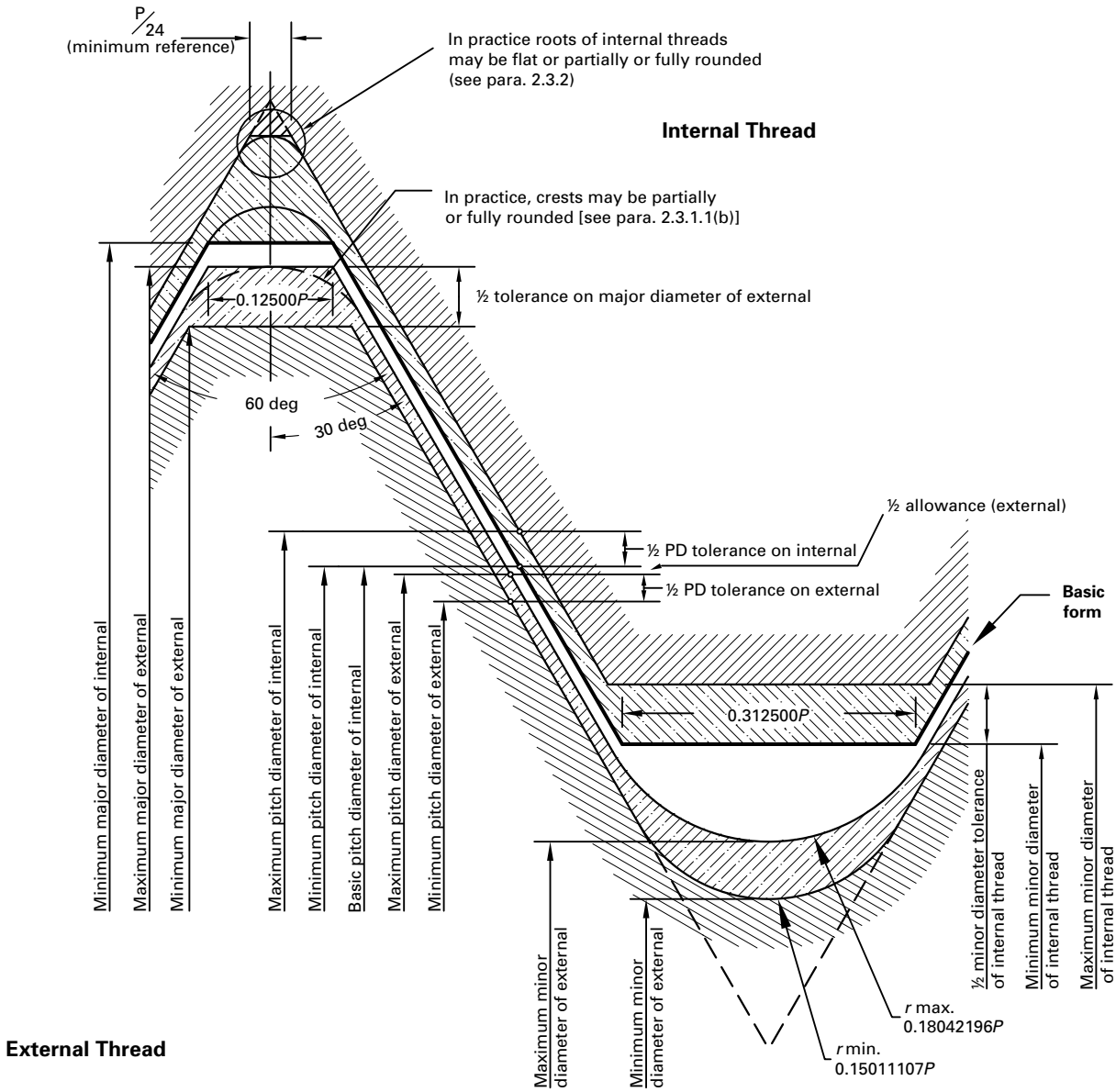
The various constant-pitch series (UN, UNR, or UNJ) with 4, 6, 8, 12, 16, 20, 28, and 32 threads per inch (see Table 1) offers a comprehensive range of diameter-pitch combinations for those purposes where the threads in the coarse-, fine-, and extra-fine-thread series do not meet the particular requirements of the design. The primary sizes of the 8-UN, 12-UN, and 16-UN series shown in Table 1 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 used 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.

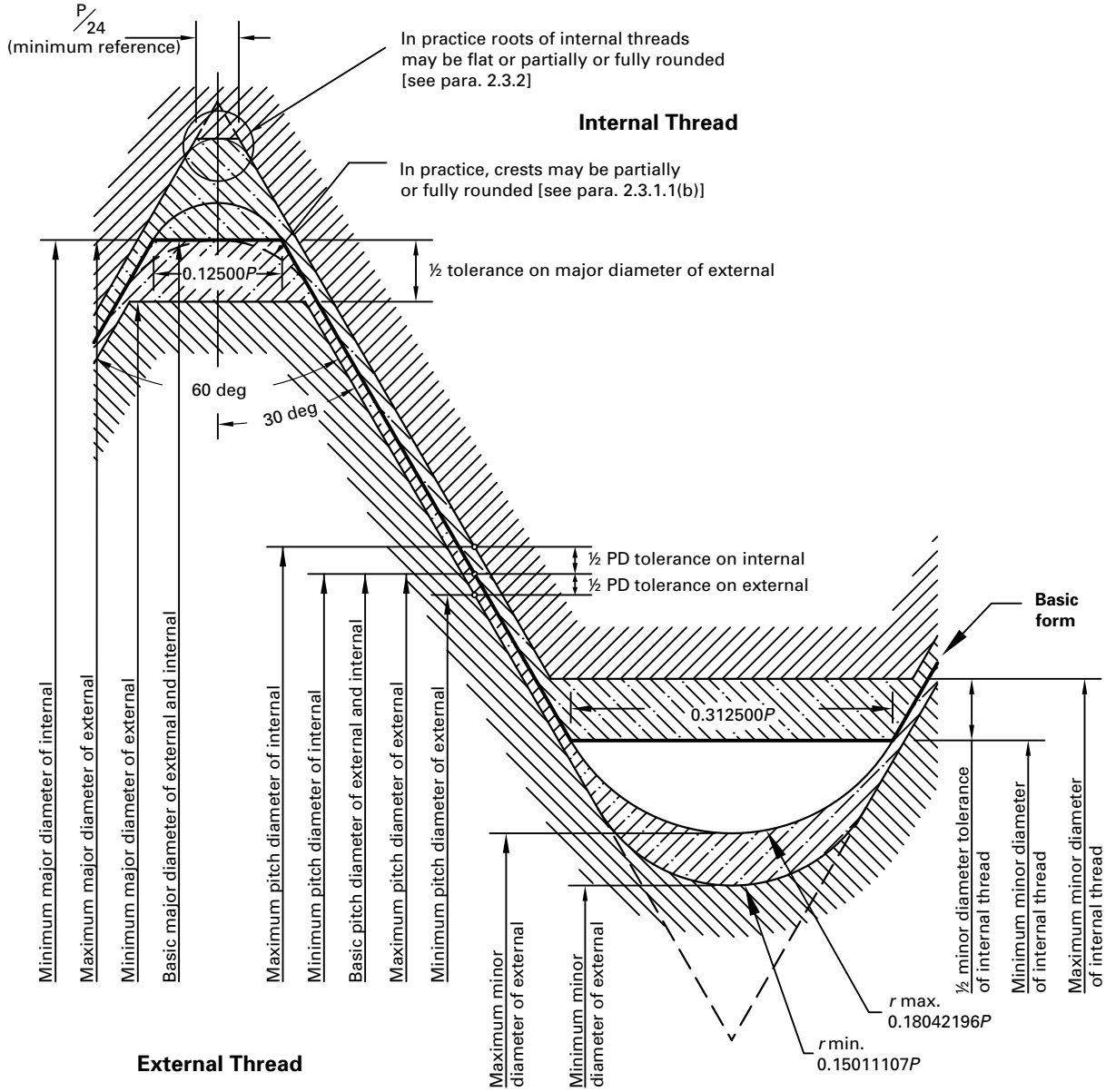
3.6.2 12-Thread Series. The 12-thread series (12-UN) is a uniform-pitch series for large diameters requiring threads of medium-fine pitch. Although originally intended for boiler practice, it is now used as a continuation of the fine-thread series for diameters larger than $1\frac{1}{2}$ in.

Figure 10 Disposition of Diametral Tolerances, Allowance, and Crest Clearance for Unified Inch Screw Thread Series UNJ, Classes 2A and 2B



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

Figure 11 Disposition of Diametral Tolerances and Crest Clearance for Unified Inch Screw Thread Series UNJ, Classes 3A and 3B



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

Table 1 Standard Series Threads (UN, UNR, and UNJ)

Nominal Size, in.			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, in.
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	I8	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

Table 1 Standard Series Threads (UN, UNR, and UNJ) (Cont'd)

Nominal Size, in.			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, in.
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
3	...	3.0000	4	...	...	UNC	6	8	12	16	20	...	...	3
...	3 1/8	3.1250	...	...	...	4	6	8	12	16	...	...	...	3 1/8
3 1/4	...	3.2500	4	...	...	UNC	6	8	12	16	...	...	...	3 1/4
...	3 3/8	3.3750	...	...	...	4	6	8	12	16	...	...	...	3 3/8
3 1/2	...	3.5000	4	...	...	UNC	6	8	12	16	...	...	...	3 1/2
...	3 5/8	3.6250	...	...	...	4	6	8	12	16	...	...	...	3 5/8
3 3/4	...	3.7500	4	...	...	UNC	6	8	12	16	...	...	...	3 3/4
...	3 7/8	3.8750	...	...	...	4	6	8	12	16	...	...	...	3 7/8
4	...	4.0000	4	...	...	UNC	6	8	12	16	...	...	...	4
...	4 1/8	4.1250	...	...	...	4	6	8	12	16	...	...	...	4 1/8
4 1/4	...	4.2500	...	...	...	4	6	8	12	16	...	...	...	4 1/4
...	4 3/8	4.3750	...	...	...	4	6	8	12	16	...	...	...	4 3/8
4 1/2	...	4.5000	...	...	...	4	6	8	12	16	...	...	...	4 1/2
...	4 5/8	4.6250	...	...	...	4	6	8	12	16	...	...	...	4 5/8
4 3/4	...	4.7500	...	...	...	4	6	8	12	16	...	...	...	4 3/4
...	4 7/8	4.8750	...	...	...	4	6	8	12	16	...	...	...	4 7/8
5	...	5.0000	...	...	...	4	6	8	12	16	...	...	...	5
...	5 1/8	5.1250	...	...	...	4	6	8	12	16	...	...	...	5 1/8
5 1/4	...	5.2500	...	...	...	4	6	8	12	16	...	...	...	5 1/4
...	5 3/8	5.3750	...	...	...	4	6	8	12	16	...	...	...	5 3/8
5 1/2	...	5.5000	...	...	...	4	6	8	12	16	...	...	...	5 1/2
...	5 5/8	5.6250	...	...	...	4	6	8	12	16	...	...	...	5 5/8
5 3/4	...	5.7500	...	...	...	4	6	8	12	16	...	...	...	5 3/4
...	5 7/8	5.8750	...	...	...	4	6	8	12	16	...	...	...	5 7/8
6	...	6.0000	...	...	...	4	6	8	12	16	...	...	...	6

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

Table 2A Limits of Size for Standard Series External Threads (UN, UNR, and UNJ)

	Nominal Size and Threads/in.	Series Designation	Class [Note (1)]	Allowance, *es*	Major Diameter, *d*			Pitch Diameter, d_2, and Functional Diameter [Note (4)]			Minor Diameter, d_1						t Radius			
											UN		UNR				UNJ			
											Reference Diameter [Notes (6), (7)]		Reference Diameter [Note (6)]		Radius		Diameter		Radius	
					Max. [Note (2)]	Min.	Min. [Note (3)]	Max. [Note (2)]	Min.	Tolerance, Td_2 [Note (5)]	Max.	Min.	Max.	Min.	Max.	M	Max.	Min.	Max.	Min.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	0 – 80 or 0.0600 – 80	UNF	2A	0.0005	0.0595	0.0563	...	0.0514	0.0496	0.001762	0.0460	0.0415	0.0446	...	0.0018	0.001	0.0451	0.0425	0.0023	0.0019
	80		3A	0.0000	0.0600	0.0568	...	0.0519	0.0506	0.0013	0.0465	0.0425	0.0451	...	0.0018	0.001	0.0456	0.0435	0.0023	0.0019
(8)	1 – 64 or 0.0730 – 64	UNC	2A	0.0006	0.0724	0.0686	...	0.0623	0.0603	0.001970	0.0555	0.0502	0.0538	...	0.0023	0.001	0.0544	0.0515	0.0028	0.0023
(8)	64		3A	0.0000	0.0730	0.0692	...	0.0629	0.0614	0.0015	0.0561	0.0513	0.0544	...	0.0023	0.001	0.0550	0.0526	0.0028	0.0023
(8)	1 – 72 or 0.0730 – 72	UNF	2A	0.0006	0.0724	0.0689	...	0.0634	0.0615	0.001899	0.0574	0.0525	0.0559	...	0.0020	0.001	0.0564	0.0536	0.0025	0.0021
(8)	72		3A	0.0000	0.0730	0.0695	...	0.0640	0.0626	0.0014	0.0580	0.0536	0.0565	...	0.0020	0.001	0.0570	0.0547	0.0025	0.0021
	2 – 56 or 0.0860 – 56	UNC	2A	0.0006	0.0854	0.0813	...	0.0738	0.0717	0.002127	0.0661	0.0601	0.0641	...	0.0026	0.001	0.0648	0.0616	0.0032	0.0027
	56		3A	0.0000	0.0860	0.0819	...	0.0744	0.0728	0.0016	0.0667	0.0612	0.0647	...	0.0026	0.001	0.0654	0.0627	0.0032	0.0027
(8)	2 – 64 or 0.0860 – 64	UNF	2A	0.0006	0.0854	0.0816	...	0.0753	0.0733	0.002040	0.0685	0.0632	0.0668	...	0.0023	0.001	0.0674	0.0645	0.0028	0.0023
(8)	64		3A	0.0000	0.0860	0.0822	...	0.0759	0.0744	0.0015	0.0691	0.0643	0.0674	...	0.0023	0.001	0.0680	0.0656	0.0028	0.0023
	3 – 48 or 0.0990 – 48	UNC	2A	0.0007	0.0983	0.0938	...	0.0848	0.0825	0.002302	0.0757	0.0690	0.0735	...	0.0030	0.002	0.0743	0.0707	0.0038	0.0031
	48		3A	0.0000	0.0990	0.0945	...	0.0855	0.0838	0.0017	0.0764	0.0703	0.0742	...	0.0030	0.002	0.0750	0.0720	0.0038	0.0031
	3 – 56 or 0.0990 – 56	UNF	2A	0.0007	0.0983	0.0942	...	0.0867	0.0845	0.002191	0.0790	0.0729	0.0770	...	0.0026	0.001	0.0777	0.0744	0.0032	0.0027
	56		3A	0.0000	0.0990	0.0949	...	0.0874	0.0858	0.0016	0.0797	0.0742	0.0777	...	0.0026	0.001	0.0784	0.0757	0.0032	0.0027
	4 – 40 or 0.1120 – 40	UNC	2A	0.0008	0.1112	0.1061	...	0.095	0.0925	0.002507	0.0841	0.0763	0.0814	...	0.0036	0.002	0.0824	0.0784	0.0045	0.0038
	40		3A	0.0000	0.1120	0.1069	...	0.0958	0.0939	0.0019	0.0849	0.0777	0.0822	...	0.0036	0.002	0.0832	0.0798	0.0045	0.0038
	4 – 48 or 0.1120 – 48	UNF	2A	0.0007	0.1113	0.1068	...	0.0978	0.0954	0.002361	0.0887	0.0819	0.0865	...	0.0030	0.002	0.0873	0.0836	0.0038	0.0031
	48		3A	0.0000	0.1120	0.1075	...	0.0985	0.0967	0.0018	0.0894	0.0832	0.0872	...	0.0030	0.002	0.0880	0.0849	0.0038	0.0031
	5 – 40 or 0.1250 – 40	UNC	2A	0.0008	0.1242	0.1191	...	0.1080	0.1054	0.002562	0.0971	0.0892	0.0944	...	0.0036	0.002	0.0954	0.0913	0.0045	0.0038
	40		3A	0.0000	0.1250	0.1199	...	0.1088	0.1069	0.0019	0.0979	0.0907	0.0952	...	0.0036	0.002	0.0962	0.0928	0.0045	0.0038
	5 – 44 or 0.1250 – 44	UNF	2A	0.0007	0.1243	0.1195	...	0.1095	0.1070	0.002484	0.0997	0.0922	0.0972	...	0.0033	0.002	0.0980	0.0941	0.0041	0.0034
	44		3A	0.0000	0.1250	0.1202	...	0.1102	0.1083	0.0019	0.1004	0.0935	0.0979	...	0.0033	0.002	0.0987	0.0954	0.0041	0.0034
	6 – 32 or 0.1380 – 32	UNC	2A	0.0008	0.1372	0.1312	...	0.1169	0.1141	0.002820	0.1034	0.0938	0.1000	...	0.0045	0.003	0.1011	0.0964	0.0056	0.0047
(8)	32		3A	0.0000	0.1380	0.1320	...	0.1177	0.1156	0.0021	0.1042	0.0953	0.1008	...	0.0045	0.003	0.1019	0.0979	0.0056	0.0047
	6 – 40 or 0.1380 – 40	UNF	2A	0.0008	0.1372	0.1321	...	0.1210	0.1184	0.002614	0.1101	0.1022	0.1074	...	0.0036	0.002	0.1084	0.1043	0.0045	0.0038
	40		3A	0.0000	0.1380	0.1329	...	0.1218	0.1198	0.0020	0.1109	0.1036	0.1082	...	0.0036	0.002	0.1092	0.1057	0.0045	0.0038

Table 2A Limits of Size for Standard Series External Threads (UN, UNR, and UNJ) (Cont'd)

	Nominal Size and Threads/in.	Series Designation	Class [Note (1)]	Allowance, *es*	Major Diameter, *d*			Pitch Diameter, d_2, and Functional Diameter [Note (4)]			Minor Diameter, d_1						t Radius			
											UN		UNR				UNJ			
					Max. [Note (2)]	Min.	Min. [Note (3)]	Max. [Note (2)]	Min.	Tolerance, Td_2 [Note (5)]	Reference Diameter [Notes (6), (7)]		Reference Diameter [Note (6)]		Radius		Diameter		Radius	
											Max.	Min.	Max.	Min.	Max.	M	Max.	Min.	Max.	Min.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		17	18	19	20
	8 – 32 or 0.1640 – 32	UNC	2A	0.0009	0.1631	0.1571	...	0.1428	0.1399	0.002916	0.1293	0.1196	0.1259	...	0.0045	0.0	0.1270	0.1222	0.0056	0.0047
(8)	32		3A	0.0000	0.1640	0.1580	...	0.1437	0.1415	0.0022	0.1302	0.1212	0.1268	...	0.0045	0.00	0.1279	0.1238	0.0056	0.0047
	8 – 36 or 0.1640 – 36	UNF	2A	0.0008	0.1632	0.1577	...	0.1452	0.1424	0.002804	0.1331	0.1244	0.1301	...	0.0040	0.00	0.1312	0.1267	0.0050	0.0042
	36		3A	0.0000	0.1640	0.1585	...	0.1460	0.1439	0.0021	0.1339	0.1259	0.1309	...	0.0040	0.00	0.1320	0.1282	0.0050	0.0042
(8)	10 – 24 or 0.1900 – 24	UNC	2A	0.0010	0.1890	0.1818	...	0.1619	0.1586	0.003319	0.1439	0.1315	0.1394	...	0.0060	0.00	0.1409	0.1350	0.0075	0.0063
	24		3A	0.0000	0.190	0.1828	...	0.1629	0.1604	0.0025	0.1449	0.1333	0.1404	...	0.0060	0.00	0.1419	0.1368	0.0075	0.0063
	10 – 32 or 0.1900 – 32	UNF	2A	0.0009	0.1891	0.1831	...	0.1688	0.1658	0.003004	0.1553	0.1455	0.1519	...	0.0045	0.00	0.1530	0.1481	0.0056	0.0047
	32		3A	0.0000	0.1900	0.1840	...	0.1697	0.1674	0.0023	0.1562	0.1471	0.1528	...	0.0045	0.00	0.1539	0.1497	0.0056	0.0047
	12 – 24 or 0.2160 – 24	UNC	2A	0.0010	0.2150	0.2078	...	0.1879	0.1845	0.003400	0.1699	0.1574	0.1654	...	0.0060	0.00	0.1669	0.1609	0.0075	0.0063
	24		3A	0.0000	0.2160	0.2088	...	0.1889	0.1863	0.0026	0.1709	0.1592	0.1664	...	0.0060	0.00	0.1679	0.1627	0.0075	0.0063
	12 – 28 or 0.2160 – 28	UNF	2A	0.0010	0.2150	0.2085	...	0.1918	0.1886	0.003224	0.1763	0.1654	0.1725	...	0.0052	0.00	0.1738	0.1684	0.0064	0.0054
	28		3A	0.0000	0.2160	0.2095	...	0.1928	0.1904	0.0024	0.1773	0.1672	0.1735	...	0.0052	0.00	0.1748	0.1702	0.0064	0.0054
(8)	12 – 32 or 0.2160 – 32	UNEF	2A	0.0010	0.2150	0.2090	...	0.1947	0.1915	0.003183	0.1812	0.1712	0.1778	...	0.0045	0.00	0.1789	0.1738	0.0056	0.0047
	32		3A	0.0000	0.2160	0.2100	...	0.1957	0.1933	0.0024	0.1822	0.1730	0.1788	...	0.0045	0.00	0.1799	0.1756	0.0056	0.0047
	1/4 – 20 or 0.2500 – 20	UNC	1A	0.0011	0.2489	0.2367	...	0.2164	0.2108	0.0056	0.1948	0.1783	0.1894	...	0.0072	0.00	...	...	...	...
	20		2A	0.0011	0.2489	0.2408	0.2367	0.2164	0.2127	0.003731	0.1948	0.1802	0.1894	...	0.0072	0.00	0.1911	0.1844	0.0090	0.0075
	20		3A	0.0000	0.2500	0.2419	...	0.2175	0.2147	0.0028	0.1959	0.1822	0.1905	...	0.0072	0.00	0.1922	0.1864	0.009	0.0075
	1/4 – 28 or 0.2500 – 28	UNF	1A	0.0010	0.2490	0.2392	...	0.2258	0.2208	0.0050	0.2103	0.1976	0.2065	...	0.0052	0.00	...	...	...	...
	28		2A	0.0010	0.2490	0.2425	...	0.2258	0.2225	0.003322	0.2103	0.1993	0.2065	...	0.0052	0.00	0.2078	0.2023	0.0064	0.0054
	28		3A	0.0000	0.2500	0.2435	...	0.2268	0.2243	0.0025	0.2113	0.2011	0.2075	...	0.0052	0.00	0.2088	0.2041	0.0064	0.0054
	1/4 – 32 or 0.2500 – 32	UNEF	2A	0.0010	0.2490	0.2430	...	0.2287	0.2255	0.003228	0.2152	0.2052	0.2118	...	0.0045	0.00	0.2129	0.2078	0.0056	0.0047
	32		3A	0.0000	0.2500	0.2440	...	0.2297	0.2273	0.0024	0.2162	0.2070	0.2128	...	0.0045	0.00	0.2139	0.2096	0.0056	0.0047
	5/16 – 18 or 0.3125 – 18	UNC	1A	0.0012	0.3113	0.2982	...	0.2752	0.2691	0.0061	0.2512	0.2330	0.2451	...	0.0080	0.00	...	...	...	...
	18		2A	0.0012	0.3113	0.3026	0.2982	0.2752	0.2712	0.004041	0.2512	0.2351	0.2451	...	0.0080	0.00	0.2471	0.2398	0.0100	0.0083
	18		3A	0.0000	0.3125	0.3038	...	0.2764	0.2734	0.0030	0.2524	0.2373	0.2463	...	0.0080	0.00	0.2483	0.2420	0.0100	0.0083
(8)	5/16 – 20 or 0.3125 – 20	UN	2A	0.0012	0.3113	0.3032	...	0.2788	0.2747	0.004060	0.2572	0.2422	0.2518	...	0.0072	0.00	0.2535	0.2464	0.0090	0.0075
(8)	20		3A	0.0000	0.3125	0.3044	...	0.2800	0.2770	0.0030	0.2584	0.2445	0.2530	...	0.0072	0.00	0.2547	0.2487	0.0090	0.0075

Table 2A Limits of Size for Standard Series External Threads (UN, UNR, and UNJ) (Cont'd)

	Nominal Size and Threads/in.	Series Designation	Class [Note (1)]	Allowance, *es*	Major Diameter, *d*			Pitch Diameter, d_2, and Functional Diameter [Note (4)]			Minor Diameter, d_1						t Radius			
											UN		UNR				UNJ			
											Reference Diameter [Notes (6), (7)]		Reference Diameter [Note (6)]		Radius		Diameter		Radius	
					Max. [Note (2)]	Min.	Min. [Note (3)]	Max. [Note (2)]	Min.	Tolerance, Td_2 [Note (5)]	Max.	Min.	Max.	Min.	Max.	M	Max.	Min.	Max.	Min.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	5/16 – 24 or 0.3125 – 24	UNF	1A	0.0011	0.3114	0.3006	...	0.2843	0.2788	0.0055	0.2663	0.2517	0.2618	...	0.0060	0.00	...	...	...	...
	24		2A	0.0011	0.3114	0.3042	...	0.2843	0.2806	0.003660	0.2663	0.2535	0.2618	...	0.0060	0.00	0.2633	0.2570	0.0075	0.0063
	24		3A	0.0000	0.3125	0.3053	...	0.2854	0.2827	0.0027	0.2674	0.2556	0.2629	...	0.0060	0.00	0.2644	0.2591	0.0075	0.0063
(8)	5/16 – 28 or 0.3125 – 28	UN	2A	0.00100	0.3115	0.3050	...	0.2883	0.2848	0.003495	0.2728	0.2616	0.2690	...	0.0052	0.00	0.2703	0.2646	0.0064	0.0054
(8)	28		3A	0.0000	0.3125	0.3060	...	0.2893	0.2867	0.0026	0.2738	0.2635	0.2700	...	0.0052	0.00	0.2713	0.2665	0.0064	0.0054
(8)	5/16 – 32 or 0.3125 – 32	UNEF	2A	0.0010	0.3115	0.3055	...	0.2912	0.2879	0.003301	0.2777	0.2676	0.2743	...	0.0045	0.00	0.2754	0.2702	0.0056	0.0047
(8)	32		3A	0.0000	0.3125	0.3065	...	0.2922	0.2897	0.0025	0.2787	0.2694	0.2753	...	0.0045	0.00	0.2764	0.2720	0.0056	0.0047
	3/8 – 16 or 0.3750 – 16	UNC	1A	0.0013	0.3737	0.3595	...	0.3331	0.3266	0.0065	0.3060	0.2860	0.2993	...	0.0090	0.00	...	...	...	...
	16		2A	0.0013	0.3737	0.3643	0.3595	0.3331	0.3287	0.004363	0.3060	0.2881	0.2993	...	0.0090	0.00	0.3015	0.2933	0.0113	0.0094
	16		3A	0.0000	0.3750	0.3656	...	0.3344	0.3311	0.0033	0.3073	0.2905	0.3006	...	0.009	0.00	0.3028	0.2957	0.0113	0.0094
	3/8 – 20 or 0.3750 – 20	UN	2A	0.0012	0.3738	0.3657	...	0.3413	0.3372	0.004124	0.3197	0.3047	0.3143	...	0.0072	0.00	0.3160	0.3089	0.0090	0.0075
	20		3A	0.0000	0.3750	0.3669	...	0.3425	0.3394	0.0031	0.3209	0.3069	0.3155	...	0.0072	0.00	0.3172	0.3111	0.0090	0.0075
	3/8 – 24 or 0.3750 – 24	UNF	1A	0.0011	0.3739	0.3631	...	0.3468	0.3411	0.0057	0.3288	0.3140	0.3243	...	0.0060	0.00	...	...	...	...
	24		2A	0.0011	0.3739	0.3667	...	0.3468	0.3430	0.003804	0.3288	0.3159	0.3243	...	0.0060	0.00	0.3258	0.3194	0.0075	0.0063
	24		3A	0.0000	0.3750	0.3678	...	0.3479	0.3450	0.0029	0.3299	0.3179	0.3254	...	0.0060	0.00	0.3269	0.3214	0.0075	0.0063
	3/8 – 28 or 0.3750 – 28	UN	2A	0.0011	0.3739	0.3674	...	0.3507	0.3471	0.003559	0.3352	0.3239	0.3314	...	0.0052	0.00	0.3327	0.3269	0.0064	0.0054
	28		3A	0.0000	0.3750	0.3685	...	0.3518	0.3491	0.0027	0.3363	0.3259	0.3325	...	0.0052	0.00	0.3338	0.3289	0.0064	0.0054
	3/8 – 32 or 0.3750 – 32	UNEF	2A	0.0010	0.3740	0.3680	...	0.3537	0.3503	0.003365	0.3402	0.3300	0.3368	...	0.0045	0.00	0.3379	0.3326	0.0056	0.0047
	32		3A	0.0000	0.3750	0.3690	...	0.3547	0.3522	0.0025	0.3412	0.3319	0.3378	...	0.0045	0.00	0.3389	0.3345	0.0056	0.0047
	7/16 – 14 or 0.4375 – 14	UNC	1A	0.0014	0.4361	0.4206	...	0.3897	0.3826	0.0071	0.3588	0.3362	0.3510	...	0.0103	0.00	...	...	...	...
	14		2A	0.0014	0.4361	0.4258	0.4206	0.3897	0.3850	0.004713	0.3588	0.3386	0.3510	...	0.0103	0.00	0.3536	0.3446	0.0129	0.0107
	14		3A	0.0000	0.4375	0.4272	...	0.3911	0.3876	0.0035	0.3602	0.3412	0.3524	...	0.0103	0.00	0.3550	0.3472	0.0129	0.0107
(8)	7/16 – 16 or 0.4375 – 16	UN	2A	0.0014	0.4361	0.4267	...	0.3955	0.3909	0.004626	0.3684	0.3503	0.3617	...	0.0090	0.00	0.3639	0.3555	0.0113	0.0094
(8)	16		3A	0.0000	0.4375	0.4281	...	0.3969	0.3934	0.0035	0.3698	0.3528	0.3631	...	0.0090	0.00	0.3653	0.3580	0.0113	0.0094
(8)	7/16 – 20 or 0.4375 – 20	UNF	1A	0.0013	0.4362	0.4240	...	0.4037	0.3974	0.0063	0.3821	0.3649	0.3767	...	0.0072	0.00	...	...	...	...
	20		2A	0.0013	0.4362	0.4281	...	0.4037	0.3995	0.004167	0.3821	0.3670	0.3767	...	0.0072	0.00	0.3784	0.3712	0.0090	0.0075
	20		3A	0.0000	0.4375	0.4294	...	0.4050	0.4019	0.0031	0.3834	0.3694	0.3780	...	0.0072	0.00	0.3797	0.3736	0.0090	0.0075

Table 2A Limits of Size for Standard Series External Threads (UN, UNR, and UNJ) (Cont'd)

	Nominal Size and Threads/in.	Series Designation	Class [Note (1)]	Allowance, *es*	Major Diameter, *d*			Pitch Diameter, d_2, and Functional Diameter [Note (4)]			Minor Diameter, d_1						t Radius			
											UN		UNR				UNJ			
					Max. [Note (2)]	Min.	Min. [Note (3)]	Max. [Note (2)]	Min.	Tolerance, Td_2 [Note (5)]	Reference Diameter [Notes (6), (7)]		Reference Diameter [Note (6)]		Radius		Diameter		Radius	
											Max.	Min.	Max.	Min.	Max.	M	Max.	Min.	Max.	Min.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		17	18	19	20
(8)	7/16 – 28 or 0.4375 – 28	UNEF	2A	0.0011	0.4364	0.4299	...	0.4132	0.4096	0.003616	0.3977	0.3864	0.3939	...	0.0052	0.0	0.3952	0.3894	0.0064	0.0054
	28		3A	0.0000	0.4375	0.4310	...	0.4143	0.4116	0.0027	0.3988	0.3884	0.3950	...	0.0052	0.00	0.3963	0.3914	0.0064	0.0054
(8)	7/16 – 32 or 0.4375 – 32	UN	2A	0.0010	0.4365	0.4305	...	0.4162	0.4128	0.003422	0.4027	0.3925	0.3993	...	0.0045	0.00	0.4004	0.3951	0.0056	0.0047
	32		3A	0.0000	0.4375	0.4315	...	0.4172	0.4146	0.0026	0.4037	0.3943	0.4003	...	0.0045	0.00	0.4014	0.3969	0.0056	0.0047
	1/2 – 13 or 0.5000 – 13	UNC	1A	0.0015	0.4985	0.4822	...	0.4485	0.4411	0.0074	0.4152	0.3911	0.4069	...	0.0111	0.00	...	...	...	...
	13		2A	0.0015	0.4985	0.4876	0.4822	0.4485	0.4435	0.004965	0.4152	0.3935	0.4069	...	0.0111	0.00	0.4096	0.4000	0.0139	0.0115
	13		3A	0.0000	0.5000	0.4891	...	0.4500	0.4463	0.0037	0.4167	0.3963	0.4084	...	0.0111	0.00	0.4111	0.4028	0.0139	0.0115
	1/2 – 16 or 0.5000 – 16	UN	2A	0.0014	0.4986	0.4892	...	0.4580	0.4533	0.004678	0.4309	0.4127	0.4242	...	0.0090	0.00	0.4264	0.4179	0.0113	0.0094
(8)	16		3A	0.0000	0.5000	0.4906	...	0.4594	0.4559	0.0035	0.4323	0.4153	0.4256	...	0.0090	0.00	0.4278	0.4205	0.0113	0.0094
	1/2 – 20 or 0.5000 – 20	UNF	1A	0.0013	0.4987	0.4865	...	0.4662	0.4598	0.0064	0.4446	0.4273	0.4392	...	0.0072	0.00	...	...	...	...
	20		2A	0.0013	0.4987	0.4906	...	0.4662	0.4619	0.004288	0.4446	0.4294	0.4392	...	0.0072	0.00	0.4409	0.4336	0.0090	0.0075
	20		3A	0.0000	0.5000	0.4919	...	0.4675	0.4643	0.0032	0.4459	0.4318	0.4405	...	0.0072	0.00	0.4422	0.4360	0.0090	0.0075
	1/2 – 28 or 0.5000 – 28	UNEF	2A	0.0011	0.4989	0.4924	...	0.4757	0.4720	0.003668	0.4602	0.4488	0.4564	...	0.0052	0.00	0.4577	0.4518	0.0064	0.0054
	28		3A	0.0000	0.5000	0.4935	...	0.4768	0.4740	0.0028	0.4613	0.4508	0.4575	...	0.0052	0.00	0.4588	0.4538	0.0064	0.0054
	1/2 – 32 or 0.5000 – 32	UN	2A	0.0010	0.4990	0.4930	...	0.4787	0.4752	0.003474	0.4652	0.4549	0.4618	...	0.0045	0.00	0.4629	0.4575	0.0056	0.0047
	32		3A	0.0000	0.5000	0.4940	...	0.4797	0.4771	0.0026	0.4662	0.4568	0.4628	...	0.0045	0.00	0.4639	0.4594	0.0056	0.0047
	9/16 – 12 or 0.5625 – 12	UNC	1A	0.0016	0.5609	0.5437	...	0.5068	0.4990	0.0078	0.4707	0.4449	0.4617	...	0.0120	0.00	...	...	...	...
	12		2A	0.0016	0.5609	0.5495	0.5437	0.5068	0.5016	0.005225	0.4707	0.4475	0.4617	...	0.0120	0.00	0.4647	0.4545	0.0150	0.0125
	12		3A	0.0000	0.5625	0.5511	...	0.5084	0.5045	0.0039	0.4723	0.4504	0.4633	...	0.0120	0.00	0.4663	0.4574	0.0150	0.0125
	9/16 – 16 or 0.5625 – 16	UN	2A	0.0014	0.5611	0.5517	...	0.5205	0.5158	0.004725	0.4934	0.4752	0.4867	...	0.0090	0.00	0.4889	0.4804	0.0113	0.0094
(8)	16		3A	0.0000	0.5625	0.5531	...	0.5219	0.5184	0.0035	0.4948	0.4778	0.4881	...	0.0090	0.00	0.4903	0.4830	0.0113	0.0094
	9/16 – 18 or 0.5625 – 18	UNF	1A	0.0014	0.5611	0.5480	...	0.5250	0.5182	0.0068	0.5010	0.4821	0.4949	...	0.0080	0.00	...	...	...	...
	18		2A	0.0014	0.5611	0.5524	...	0.5250	0.5205	0.004547	0.501	0.4844	0.4949	...	0.0080	0.00	0.4969	0.4891	0.0100	0.0083
	18		3A	0.0000	0.5625	0.5538	...	0.5264	0.5230	0.0034	0.5024	0.4869	0.4963	...	0.0080	0.00	0.4983	0.4916	0.0100	0.0083
(8)	9/16 – 20 or 0.5625 – 20	UN	2A	0.0013	0.5612	0.5531	...	0.5287	0.5244	0.004280	0.5071	0.4919	0.5017	...	0.0072	0.00	0.5034	0.4961	0.0090	0.0075
(8)	20		3A	0.0000	0.5625	0.5544	...	0.5300	0.5268	0.0032	0.5084	0.4943	0.5030	...	0.0072	0.00	0.5047	0.4985	0.0090	0.0075
(8)	9/16 – 24 or 0.5625 – 24	UNEF	2A	0.0012	0.5613	0.5541	...	0.5342	0.5302	0.003960	0.5162	0.5031	0.5117	...	0.0060	0.00	0.5132	0.5066	0.0075	0.0063

Table 2A Limits of Size for Standard Series External Threads (UN, UNR, and UNJ) (Cont'd)

	Nominal Size and Threads/in.	Series Designation	Class [Note (1)]	Allowance, *es*	Major Diameter, *d*			Pitch Diameter, d_2, and Functional Diameter [Note (4)]			Minor Diameter, d_1						t Radius			
											UN		UNR				UNJ			
											Reference Diameter [Notes (6), (7)]		Reference Diameter [Note (6)]		Radius		Diameter		Radius	
					Max. [Note (2)]	Min.	Min. [Note (3)]	Max. [Note (2)]	Min.	Tolerance, Td_2 [Note (5)]	Max.	Min.	Max.	Min.	Max.	M	Max.	Min.	Max.	Min.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
(8)	24		3A	0.0000	0.5625	0.5553	...	0.5354	0.5324	0.0030	0.5174	0.5053	0.5129	...	0.0060	0.004	0.5144	0.5088	0.0075	0.0063
	9/16 – 28 or 0.5625 – 28	UN	2A	0.0011	0.5614	0.5549	...	0.5382	0.5345	0.003715	0.5227	0.5113	0.5189	...	0.0052	0.003	0.5202	0.5143	0.0064	0.0054
	28		3A	0.0000	0.5625	0.5560	...	0.5393	0.5365	0.0028	0.5238	0.5133	0.5200	...	0.0052	0.003	0.5213	0.5163	0.0064	0.0054
(8)	9/16 – 32 or 0.5625 – 32	UN	2A	0.0011	0.5614	0.5554	...	0.5411	0.5376	0.003521	0.5276	0.5173	0.5242	...	0.0045	0.003	0.5253	0.5199	0.0056	0.0047
	32		3A	0.0000	0.5625	0.5565	...	0.5422	0.5396	0.0026	0.5287	0.5193	0.5253	...	0.0045	0.003	0.5264	0.5219	0.0056	0.0047
(8)	5/8 – 11 or 0.625 – 11	UNC	1A	0.0017	0.6233	0.6051	...	0.5643	0.5560	0.0083	0.5249	0.4970	0.5150	...	0.0131	0.009	...	...	...	...
(8)	11		2A	0.0017	0.6233	0.6112	0.6052	0.5643	0.5588	0.005501	0.5249	0.4998	0.5150	...	0.0131	0.009	0.5184	0.5074	0.0164	0.0136
	11		3A	0.0000	0.6250	0.6129	...	0.5660	0.5619	0.0041	0.5266	0.5029	0.5167	...	0.0131	0.009	0.5201	0.5105	0.0164	0.0136
	5/8 – 12 or 0.625 – 12	UN	2A	0.0016	0.6234	0.6120	...	0.5693	0.5639	0.005443	0.5332	0.5098	0.5242	...	0.0120	0.009	0.5272	0.5168	0.0150	0.0125
	12		3A	0.0000	0.6250	0.6136	...	0.5709	0.5668	0.0041	0.5348	0.5127	0.5258	...	0.0120	0.009	0.5288	0.5197	0.0150	0.0125
	5/8 – 16 or 0.6250 – 16	UN	2A	0.0014	0.6236	0.6142	...	0.5830	0.5782	0.004769	0.5559	0.5376	0.5492	...	0.0090	0.006	0.5514	0.5428	0.0113	0.0094
	16		3A	0.0000	0.6250	0.6156	...	0.5844	0.5808	0.0036	0.5573	0.5402	0.5506	...	0.0090	0.006	0.5528	0.5454	0.0113	0.0094
	5/8 – 18 or 0.6250 – 18	UNF	1A	0.0014	0.6236	0.6105	...	0.5875	0.5805	0.0070	0.5635	0.5444	0.5574	...	0.0080	0.006	...	...	...	...
	18		2A	0.0014	0.6236	0.6149	...	0.5875	0.5828	0.004652	0.5635	0.5467	0.5574	...	0.0080	0.006	0.5594	0.5514	0.0100	0.0083
	18		3A	0.0000	0.6250	0.6163	...	0.5889	0.5854	0.0035	0.5649	0.5493	0.5588	...	0.0080	0.006	0.5608	0.5540	0.0100	0.0083
	5/8 – 20 or 0.6250 – 20	UN	2A	0.0013	0.6237	0.6156	...	0.5912	0.5869	0.004324	0.5696	0.5544	0.5642	...	0.0072	0.005	0.5659	0.5586	0.0090	0.0075
	20		3A	0.0000	0.6250	0.6169	...	0.5925	0.5893	0.0032	0.5709	0.5568	0.5655	...	0.0072	0.005	0.5672	0.5610	0.0090	0.0075
	5/8 – 24 or 0.6250 – 24	UNEF	2A	0.0012	0.6238	0.6166	...	0.5967	0.5927	0.004004	0.5787	0.5656	0.5742	...	0.0060	0.004	0.5757	0.5691	0.0075	0.0063
	24		3A	0.0000	0.6250	0.6178	...	0.5979	0.5949	0.0030	0.5799	0.5678	0.5754	...	0.0060	0.004	0.5769	0.5713	0.0075	0.0063
	5/8 – 28 or 0.6250 – 28	UN	2A	0.0011	0.6239	0.6174	...	0.6007	0.5969	0.003759	0.5852	0.5737	0.5814	...	0.0052	0.003	0.5827	0.5767	0.0064	0.0054
	28		3A	0.0000	0.6250	0.6185	...	0.6018	0.5990	0.0028	0.5863	0.5758	0.5825	...	0.0052	0.003	0.5838	0.5788	0.0064	0.0054
	5/8 – 32 or 0.6250 – 32	UN	2A	0.0011	0.6239	0.6179	...	0.6036	0.6000	0.003565	0.5901	0.5797	0.5867	...	0.0045	0.003	0.5878	0.5823	0.0056	0.0047
	32		3A	0.0000	0.6250	0.6190	...	0.6047	0.6020	0.0027	0.5912	0.5817	0.5878	...	0.0045	0.003	0.5889	0.5843	0.0056	0.0047
(8)	11/16 – 12 or 0.6875 – 12	UN	2A	0.0016	0.6859	0.6745	...	0.6318	0.6263	0.005485	0.5957	0.5722	0.5867	...	0.0120	0.009	0.5897	0.5792	0.0150	0.0125
	12		3A	0.0000	0.6875	0.6761	...	0.6334	0.6293	0.0041	0.5973	0.5752	0.5883	...	0.0120	0.009	0.5913	0.5822	0.0150	0.0125
(8)	11/16 – 16 or 0.6875 – 16	UN	2A	0.0014	0.6861	0.6767	...	0.6455	0.6407	0.004811	0.6184	0.6001	0.6117	...	0.0090	0.006	0.6139	0.6053	0.0113	0.0094

Table 2A Limits of Size for Standard Series External Threads (UN, UNR, and UNJ) (Cont'd)

	Nominal Size and Threads/in.	Series Designation	Class [Note (1)]	Allowance, *es*	Major Diameter, *d*			Pitch Diameter, d_2, and Functional Diameter [Note (4)]			Minor Diameter, d_1						t Radius			
											UN		UNR				UNJ			
					Max. [Note (2)]	Min.	Min. [Note (3)]	Max. [Note (2)]	Min.	Tolerance, Td_2 [Note (5)]	Reference Diameter [Notes (6), (7)]		Reference Diameter [Note (6)]		Radius		Diameter		Radius	
											Max.	Min.	Max.	Min.	Max.	M	Max.	Min.	Max.	Min.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		17	18	19	20
	16		3A	0.0000	0.6875	0.6781	...	0.6469	0.6433	0.0036	0.6198	0.6027	0.6131	...	0.0090	0.0	0.6153	0.6079	0.0113	0.0094
(8)	11/16 – 20 or 0.6875 – 20	UN	2A	0.0013	0.6862	0.6781	...	0.6537	0.6493	0.004366	0.6321	0.6168	0.6267	...	0.0072	0.005	0.6284	0.6210	0.0090	0.0075
(8)	20		3A	0.0000	0.6875	0.6794	...	0.6550	0.6517	0.0033	0.6334	0.6192	0.6280	...	0.0072	0.005	0.6297	0.6234	0.0090	0.0075
(8)	11/16 – 24 or 0.6875 – 24	UNEF	2A	0.0012	0.6863	0.6791	...	0.6592	0.6552	0.004046	0.6412	0.6281	0.6367	...	0.0060	0.004	0.6382	0.6316	0.0075	0.0063
	24		3A	0.0000	0.6875	0.6803	...	0.6604	0.6574	0.0030	0.6424	0.6303	0.6379	...	0.0060	0.004	0.6394	0.6338	0.0075	0.0063
	11/16 – 28 or 0.6875 – 28	UN	2A	0.0011	0.6864	0.6799	...	0.6632	0.6594	0.003801	0.6477	0.6362	0.6439	...	0.0052	0.003	0.6452	0.6392	0.0064	0.0054
(8)	28		3A	0.0000	0.6875	0.6810	...	0.6643	0.6614	0.0029	0.6488	0.6382	0.6450	...	0.0052	0.003	0.6463	0.6412	0.0064	0.0054
(8)	11/16 – 32 or 0.6875 – 32	UN	2A	0.0011	0.6864	0.6804	...	0.6661	0.6625	0.003607	0.6526	0.6422	0.6492	...	0.0045	0.003	0.6503	0.6448	0.0056	0.0047
	32		3A	0.0000	0.6875	0.6815	...	0.6672	0.6645	0.0027	0.6537	0.6442	0.6503	...	0.0045	0.003	0.6514	0.6468	0.0056	0.0047
	3/4 – 10 or 0.7500 – 10	UNC	1A	0.0018	0.7482	0.7288	...	0.6832	0.6744	0.0088	0.6399	0.6094	0.6291	...	0.0144	0.010	...	...	...	...
	10		2A	0.0018	0.7482	0.7353	0.7288	0.6832	0.6773	0.005894	0.6399	0.6123	0.6291	...	0.0144	0.010	0.6327	0.6207	0.0180	0.0150
	10		3A	0.0000	0.7500	0.7371	...	0.6850	0.6806	0.0044	0.6417	0.6156	0.6309	...	0.0144	0.010	0.6345	0.6240	0.0180	0.0150
	3/4 – 12 or 0.7500 – 12	UN	2A	0.0017	0.7483	0.7369	...	0.6942	0.6887	0.005524	0.6581	0.6346	0.6491	...	0.0120	0.009	0.6521	0.6416	0.0150	0.0125
	12		3A	0.0000	0.7500	0.7386	...	0.6959	0.6918	0.0041	0.6598	0.6377	0.6508	...	0.0120	0.009	0.6538	0.6447	0.0150	0.0125
	3/4 – 16 or 0.7500 – 16	UNF	1A	0.0015	0.7485	0.7343	...	0.7079	0.7004	0.0075	0.6808	0.6598	0.6741	...	0.0090	0.006	...	...	...	...
	16		2A	0.0015	0.7485	0.7391	...	0.7079	0.7029	0.005024	0.6808	0.6623	0.6741	...	0.0090	0.006	0.6763	0.6675	0.0113	0.0094
(8)	16		3A	0.0000	0.7500	0.7406	...	0.7094	0.7056	0.0038	0.6823	0.6650	0.6756	...	0.0090	0.006	0.6778	0.6702	0.0113	0.0094
	3/4 – 20 or 0.7500 – 20	UNEF	2A	0.0013	0.7487	0.7406	...	0.7162	0.7118	0.004405	0.6946	0.6793	0.6892	...	0.0072	0.005	0.6909	0.6835	0.0090	0.0075
	20		3A	0.0000	0.7500	0.7419	...	0.7175	0.7142	0.0033	0.6959	0.6817	0.6905	...	0.0072	0.005	0.6922	0.6859	0.0090	0.0075
	3/4 – 28 or 0.7500 – 28	UN	2A	0.0012	0.7488	0.7423	...	0.7256	0.7218	0.003840	0.7101	0.6986	0.7063	...	0.0052	0.003	0.7076	0.7016	0.0064	0.0054
(8)	28		3A	0.0000	0.7500	0.7435	...	0.7268	0.7239	0.0029	0.7113	0.7007	0.7075	...	0.0052	0.003	0.7088	0.7037	0.0064	0.0054
	3/4 – 32 or 0.7500 – 32	UN	2A	0.0011	0.7489	0.7429	...	0.7286	0.7250	0.003646	0.7151	0.7047	0.7117	...	0.0045	0.003	0.7128	0.7073	0.0056	0.0047
	32		3A	0.0000	0.7500	0.7440	...	0.7297	0.7270	0.0027	0.7162	0.7067	0.7128	...	0.0045	0.003	0.7139	0.7093	0.0056	0.0047
(8)	13/16 – 12 or 0.8125 – 12	UN	2A	0.0017	0.8108	0.7994	...	0.7567	0.7511	0.005561	0.7206	0.6970	0.7116	...	0.0120	0.009	0.7146	0.7040	0.0150	0.0125
(8)	12		3A	0.0000	0.8125	0.8011	...	0.7584	0.7542	0.0042	0.7223	0.7001	0.7133	...	0.0120	0.009	0.7163	0.7071	0.0150	0.0125
(8)	13/16 – 16 or 0.8125 – 16	UN	2A	0.0015	0.8110	0.8016	...	0.7704	0.7655	0.004887	0.7433	0.7249	0.7366	...	0.0090	0.006	0.7388	0.7301	0.0113	0.0094

Table 2A Limits of Size for Standard Series External Threads (UN, UNR, and UNJ) (Cont'd)

	Nominal Size and Threads/in.	Series Designation	Class [Note (1)]	Allowance, *es*	Major Diameter, *d*			Pitch Diameter, d_2, and Functional Diameter [Note (4)]			Minor Diameter, d_1						t Radius			
											UN		UNR				UNJ			
											Reference Diameter [Notes (6), (7)]		Reference Diameter [Note (6)]		Radius		Diameter		Radius	
					Max. [Note (2)]	Min.	Min. [Note (3)]	Max. [Note (2)]	Min.	Tolerance, Td_2 [Note (5)]	Max.	Min.	Max.	Min.	Max.	M	Max.	Min.	Max.	Min.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
(8)	16		3A	0.0000	0.8125	0.8031	...	0.7719	0.7682	0.0037	0.7448	0.7276	0.7381	...	0.0090	0.00	0.7403	0.7328	0.0113	0.0094
(8)	13/16 – 20 or 0.8125 – 20	UNEF	2A	0.0013	0.8112	0.8031	...	0.7787	0.7743	0.004442	0.7571	0.7418	0.7517	...	0.0072	0.00	0.7534	0.7460	0.0090	0.0075
(8)	20		3A	0.0000	0.8125	0.8044	...	0.7800	0.7767	0.0033	0.7584	0.7442	0.7530	...	0.0072	0.00	0.7547	0.7484	0.0090	0.0075
(8)	13/16 – 28 or 0.8125 – 28	UN	2A	0.0012	0.8113	0.8048	...	0.7881	0.7842	0.003877	0.7726	0.7610	0.7688	...	0.0052	0.00	0.7701	0.7640	0.0064	0.0054
(8)	28		3A	0.0000	0.8125	0.8060	...	0.7893	0.7864	0.0029	0.7738	0.7632	0.7700	...	0.0052	0.00	0.7713	0.7662	0.0064	0.0054
(8)	13/16 – 32 or 0.8125 – 32	UN	2A	0.0011	0.8114	0.8054	...	0.7911	0.7874	0.003683	0.7776	0.7671	0.7742	...	0.0045	0.00	0.7753	0.7697	0.0056	0.0047
(8)	32		3A	0.0000	0.8125	0.8065	...	0.7922	0.7894	0.0028	0.7787	0.7691	0.7753	...	0.0045	0.00	0.7764	0.7717	0.0056	0.0047
	7/8 – 9 or 0.8750 – 9	UNC	1A	0.0019	0.8731	0.8523	...	0.8009	0.7914	0.0095	0.7528	0.7192	0.7408	...	0.0160	0.01	...	...	...	...
	9		2A	0.0019	0.8731	0.8592	0.8523	0.8009	0.7946	0.006305	0.7528	0.7224	0.7408	...	0.0160	0.01	0.7448	0.7317	0.0200	0.0167
	9		3A	0.0000	0.8750	0.8611	...	0.8028	0.7981	0.0047	0.7547	0.7259	0.7427	...	0.0160	0.01	0.7467	0.7352	0.0200	0.0167
(8)	7/8 – 12 or 0.8750 – 12	UN	2A	0.0017	0.8733	0.8619	...	0.8192	0.8136	0.005596	0.7831	0.7595	0.7741	...	0.0120	0.00	0.7771	0.7665	0.0150	0.0125
(8)	12		3A	0.0000	0.8750	0.8636	...	0.8209	0.8167	0.0042	0.7848	0.7626	0.7758	...	0.0120	0.00	0.7788	0.7696	0.0150	0.0125
(8)	7/8 – 14 or 0.8750 – 14	UNF	1A	0.0016	0.8734	0.8579	...	0.8270	0.8189	0.0081	0.7961	0.7725	0.7883	...	0.0103	0.00	...	...	...	...
(8)	14		2A	0.0016	0.8734	0.8631	...	0.8270	0.8216	0.005420	0.7961	0.7752	0.7883	...	0.0103	0.00	0.7909	0.7812	0.0129	0.0107
(8)	14		3A	0.0000	0.8750	0.8647	...	0.8286	0.8245	0.0041	0.7977	0.7781	0.7899	...	0.0103	0.00	0.7925	0.7841	0.0129	0.0107
(8)	7/8 – 16 or 0.8750 – 16	UN	2A	0.0015	0.8735	0.8641	...	0.8329	0.8280	0.004922	0.8058	0.7874	0.7991	...	0.0090	0.00	0.8013	0.7926	0.0113	0.0094
(8)	16		3A	0.0000	0.8750	0.8656	...	0.8344	0.8307	0.0037	0.8073	0.7901	0.8006	...	0.0090	0.00	0.8028	0.7953	0.0113	0.0094
(8)	7/8 – 20 or 0.8750 – 20	UNEF	2A	0.0013	0.8737	0.8656	...	0.8412	0.8367	0.004477	0.8196	0.8042	0.8142	...	0.0072	0.00	0.8159	0.8084	0.0090	0.0075
(8)	20		3A	0.0000	0.8750	0.8669	...	0.8425	0.8391	0.0034	0.8209	0.8066	0.8155	...	0.0072	0.00	0.8172	0.8108	0.0090	0.0075
(8)	7/8 – 28 or 0.8750 – 28	UN	2A	0.0012	0.8738	0.8673	...	0.8506	0.8467	0.003912	0.8351	0.8235	0.8313	...	0.0052	0.00	0.8326	0.8265	0.0064	0.0054
(8)	28		3A	0.0000	0.8750	0.8685	...	0.8518	0.8489	0.0029	0.8363	0.8257	0.8325	...	0.0052	0.00	0.8338	0.8287	0.0064	0.0054
(8)	7/8 – 32 or 0.8750 – 32	UN	2A	0.0011	0.8739	0.8679	...	0.8536	0.8499	0.003718	0.8401	0.8296	0.8367	...	0.0045	0.00	0.8378	0.8322	0.0056	0.0047
(8)	32		3A	0.0000	0.8750	0.8690	...	0.8547	0.8519	0.0028	0.8412	0.8316	0.8378	...	0.0045	0.00	0.8389	0.8342	0.0056	0.0047
(8)	15/16 – 12 or 0.9375 – 12	UN	2A	0.0017	0.9358	0.9244	...	0.8817	0.8761	0.005629	0.8456	0.8220	0.8366	...	0.0120	0.00	0.8396	0.8290	0.0150	0.0125
(8)	12		3A	0.0000	0.9375	0.9261	...	0.8834	0.8792	0.0042	0.8473	0.8251	0.8383	...	0.0120	0.00	0.8413	0.8321	0.0150	0.0125
(8)	15/16 – 16 or 0.9375 – 16	UN	2A	0.0015	0.9360	0.9266	...	0.8954	0.8904	0.004955	0.8683	0.8498	0.8616	...	0.0090	0.00	0.8638	0.8550	0.0113	0.0094