

FED-STD-H28/2B  
20 August 1991  
SUPERSEDING  
FED-STD-H28/2A  
20 April 1984  
(See Note)

**FEDERAL STANDARD**  
**SCREW-THREAD STANDARDS FOR FEDERAL SERVICES**  
**SECTION 2**  
**UNIFIED INCH SCREW THREADS—**  
**UN AND UNR THREAD FORMS**

This standard was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

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## FED-STD-H28/2B

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## FOREWORD

This section was developed to provide Unified Inch Screw Threads for the Federal Services. It was formerly known as "Unified Thread Form and Thread Series for Bolts, Screws, Nuts, Tapped Holes and General Applications". FED-STD-H28/2A was a complete revision of FED-STD-H28/2 dated 31 March 1978. It added the material previously identified as FED-STD-H28/3 dated 31 March 1978, which was known as "Unified Threads of Special Diameters, Pitches, and Lengths of Engagement". Material from Appendices A3 and A5 of FED-STD-H28 dated 31 March 1978 was revised and became Appendices A and B, respectively, of FED-STD-H28/2A.

FED-STD-H28/2A was prepared by the Defense Industrial Supply Center (DLA-IS) and incorporated the American National Standard for Unified Inch Screw Threads, ANSI B1.1-1982. Significant changes from the previous issues included the following:

- (1) Added UNR, external thread form with mandatory rounded root.
- (2) Revised tolerance requirements for lead and flank angles.
- (3) Added requirements for control of surface texture, chamfers, and rolled thread lead-ins and run-outs.
- (4) Added requirement that inspection methods for acceptability are in accordance with FED-STD-H28/20.

FED-STD-H28/2B incorporates the American National Standard for Unified Inch Screw Threads, ASME B1.1-1989 which superseded ANSI B1.1-1982 and its supplement, ANSI/ASME B1.1a-1984. It updates the FED-STD-H28/2A dated 20 April 1984 and improves the legibility of the tables. Appendix C was added to provide information about the obsolete American National form threads.

## SECTION 2 - Unified Inch Screw Threads - UN and UNR Thread Forms

1. Scope. This section provides the standard for unified inch screw threads to be used by the Federal Services.

1.1 Limitations. Only UN and UNR screw threads are covered in this section. For UNJ threads (controlled external thread rounded root with increased basic minor diameter) see FED-STD-H28/4 (MIL-S-8879). For UNM threads (miniature threads) see FED-STD-H28/5.

### 1.2 Application.

1.2.1 UN form screw threads. The UN thread is intended for general purpose fastening applications. Its external thread root may be either flat or rounded.

1.2.2 UNR form screw threads. The UNR form applies only to external threads. Its design form is the same as that of the external UN thread except that the root is required to be rounded. UNR threads are applied most often to high volume commercial fastener threads produced by rolling.

**NOTE:** The mandatory rounded root of the UNR thread greatly reduces the concentration of stress, hence increases the fatigue life of threaded parts.

### 2. Referenced documents.

2.1 Government publications. The issues of the following documents in effect on the date of invitation for bids or request for proposal form a part of this standard to the extent specified herein.

#### Federal standards.

FED-STD-H28/1 - Nomenclature, Definitions and Letter Symbols for Screw Threads

FED-STD-H28/6 - Gages and Gaging for Unified Screw Threads

FED-STD-H28/20 - Inspection Methods for Acceptability of UN, UNR, UNJ, M and MJ Screw-Threads

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards, and Commercial Item Descriptions. The Index, which includes cumulative bi-monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FED-STD-H28/2B

(Single copies of this standard and other Federal specifications, standards and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available from the General Services Administration Specification Section, Room 6654, 7th and D Streets, S.W., Washington, DC 20407; telephone (202) 708-9205.

(Federal Government activities may obtain copies of Federal standardization documents, and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

2.2 Other publications. The following documents form a part of this standard to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American National Standards.

ASME B1.1-1989 - Unified Inch Screw Threads (UN and UNR Thread Form)

ANSI/ASME B46.1 - Surface Texture - Surface Roughness, Waviness and Lay

(Application for copies should be addressed to the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017 or the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

3. Definitions. The terms applicable to this standard are defined in FED-STD-H28/1.

4. General requirements.

4.1 Screw threads. Unified inch screw threads shall be in accordance with ASME B1.1-1989 and this Federal Standard. Only Standard Series Unified Screw Threads, listed in Table 3A of ASME B1.1-1989, shall be used for new design for the Federal Services unless prior approval has been granted by the procurement authority to deviate from them. Coarse and fine thread series are preferred.

4.2 Acceptability. Screw thread inspection methods for acceptability shall be in accordance with FED-STD-H28/20. The required gaging system shall be specified in accordance with that standard.

4.3 Gages and gaging. Gages and gaging shall be in accordance with FED-STD-H28/6.

## 5. Detailed requirements.

5.1 Diameter-pitch combinations. When standard size screw threads referred to in 4.1 cannot be used, the designer should choose preferred sizes of special threads listed in Table 3B of ASME B1.1-1989. If this is not possible, consideration should be given to the following sub-paragraphs in the choice of thread.

5.1.1 Preferred non-standard diameters. Whenever possible, the nominal diameter should be selected from series of diameter increments as follows:

| Diameter range   | First choice increment | Second choice increment |
|------------------|------------------------|-------------------------|
| inch             | inch                   | inch                    |
| 0.25 to 0.6      | 0.05                   | —                       |
| above 0.6 to 1.5 | 0.1                    | 0.05                    |
| above 1.5 to 6.0 | 0.25                   | 0.1                     |
| above 6 to 16    | 0.5                    | 0.25                    |
| above 16 to 24   | 1.0                    | 0.5                     |

It is recommended that diameters less than 0.25 inch conform to the standard sizes as there is virtually no necessity for the selection of a diameter not included in those sizes. Also, the coarse and fine thread series provide ample choice of diameter-pitch combinations.

5.1.2 Preferred non-standard pitches. Whenever possible, the pitch should be selected from one of the following: 40, 36, 32, 28, 24, 20, 16, 12, 10, 8, 6 and 4 threads per inch. Intermediate pitches should be used only when absolutely necessary. Pitches coarser than 4 threads per inch are not recommended. The curves shown in Figure 2.B.2 of Appendix B cover the practical diameter limits suggested for each pitch.

5.2 Thread class selection. Standard Unified thread classes and their applications are described in Section 4 of ASME B1.1-1989. When selecting a thread class, consideration should first be given to the use of a class 2A external thread with a class 2B internal thread since these classes are designed for general use. Before specifying class 3A/3B series, it must be considered whether the additional production cost, necessary for the tighter fit and tolerance is justified. If a fit looser than the standard class 1A/1B is required, the non-preferred class 1AR may be specified for an external thread of 16 threads per inch and coarser. This special class combines the larger allowance of the old American National class 1 thread with the Unified class 1A tolerance. See 5.2.2 for class 1AR allowance.

## FED-STD-H28/2B

5.2.1 Replacements for obsolete American National thread classes. When threads specified with the obsolete American National thread classes are to be replaced by unified threads, the following guidelines are provided:

- a. American National class 1 coarse thread sizes (NC-1) is approximately equivalent to Unified class 1A/1B series. Class 1 fine thread series (NF-1) is approximately equivalent dimensionally to Unified class 2A/2B series. Standard Unified series threads should be considered prior to approval of replacement by non-standard threads.
- b. American National class 2 coarse thread series (NC-2), 8 thread series (8N-2), 12 thread series (12N-2), 16 thread series (16N-2), and extra fine thread series (NEF-2) are most nearly equivalent to Unified series UNC-2A/2B, 8UN-2A/2B, 12UN-2A/2B, 16UN-2A/2B and UNEF-2A/2B, respectively. Class 2 fine thread series (NF-2) is approximately equivalent dimensionally to Unified class 3A/3B series, but the use of class 2A/2B series should be considered prior to approval of replacement by class 3A/3B.
- c. American National class 3 series NC-3, NF-3, NEF-3, 8N-3, 12N-3 and 16N-3 are most nearly equivalent to Unified class 3 series UNC-3A/3B, UNF-3A/3B, UNEF-3A/3B, 8UN-3A/3B, 12UN-3A/3B and 16UN-3A/3B, respectively.
- d. There is no Unified thread class equivalent to the old American National class 4 which required selective fit of parts due to the possibility of interference.

5.2.2 Thread allowance and tolerance. Allowances and tolerances specified for standard Unified thread classes are described in Section 5 of ASME B1.1-1989. For the special external thread class 1AR, tolerances are the same as for class 1A and allowances are as follows:

| Threads per inch | Class 1AR allowance |
|------------------|---------------------|
|                  | inch                |
| 16               | 0.0018              |
| 14               | 0.0021              |
| 12               | 0.0024              |
| 10               | 0.0028              |
| 8                | 0.0034              |
| 6                | 0.0044              |
| 4                | 0.0064              |

To complement paragraph 5.6 of ASME B1.1-1989, recommended tap drill sizes and hole size limits before threading, for different lengths of engagement, are included in Appendix A.

5.3 Designation. Designation of Unified screw threads is in accordance with section 6 of ASME B1.1-1989. Nominal size shall be stated in decimals. The symbol UNS is applicable to any thread:

- (1) having the basic Unified thread form
- and (2) with limits based upon Unified formulations
- and (3) which is not in the standard series listed in Table 3A of ASME B1.1-1989.

5.4 Limits of size. See section 8 of ASME B1.1-1989 for limits of size of standard and preferred non-standard threads and for information used for calculation of non-standard thread size limits which are not tabulated. For class 1AR, calculate as for class 1A except allowance is tabulated in 5.2.2. The following example illustrates the procedure necessary to calculate the limits of size of a non-standard thread; this follows the outlines in tables 1A and 1B of ASME B1.1-1989:

External thread, 2.500 - 28UNS-2A  
Length of engagement, 1 inch

Maximum major diameter = Nominal size - allowance  
(section 13 of ASME B1.1-1989)  
= 2.5000 - 0.0014 (from table 32 of ASME B1.1-1989)  
= 2.4986

Minimum major diameter = Maximum major diameter - tolerance  
(section 13 of ASME B1.1-1989)  
= 2.4986 - 0.0065 (from table 31 of ASME B1.1-1989)  
= 2.4921

Maximum pitch diameter = Maximum major diameter -  $h_p$   
(table 6, col. 13 of ASME B1.1-1989)  
= 2.4986 - 0.0232 (rounded from 0.023197)  
= 2.4754

Minimum pitch diameter = Maximum pitch diameter - tolerance  
(section 13 of ASME B1.1-1989)  
= 2.4754 - 0.0056 (from table 34 of ASME B1.1-1989)  
= 2.4698

Nominal (maximum) minor diameter = Maximum major diameter -  $2h_1$   
(table 6, col. 15 of ASME B1.1-1989)  
= 2.4986 - 0.0387 (rounded from 0.03866)  
= 2.4599

## FED-STD-H28/2B

Internal thread, 2.500 - 28UNS-2B  
(to mate with the above thread)

Minimum minor diameter = Nominal size -  $2h_n$   
(table 6, col. 15 of ASME B1.1-1989)  
= 2.5000 - 0.0387 (rounded from 0.03866)  
= 2.4613 which is rounded to 2.461

Maximum minor diameter = Minimum minor diameter + tolerance  
(section 13 of ASME B1.1-1989)  
= 2.4613 + 0.0063 (from table 39 of ASME B1.1-1989  
for length of engagement of 0.4D)  
= 2.4676 which is rounded to 2.468

Minimum pitch diameter = Nominal size -  $h_p$   
(table 6, col. 13 of ASME B1.1-1989)  
= 2.5000 - 0.0232 (rounded from 0.023197)  
= 2.4768

Maximum pitch diameter = Minimum pitch diameter + tolerance  
(section 13 of ASME B1.1-1989)  
= 2.4768 + 0.0073 (from table 37 of ASME B1.1-1989)  
= 2.4841

Nominal (minimum) major diameter = Minimum size  
= 2.5000

Factors used in the design of threads, particularly special threads, are presented in Appendix B. It is to be noted that deviations from standard tolerances for major diameter of the external thread and for minor diameter of internal thread may be necessary in order to arrive at the optimum design.

### 5.5 Surface texture.

5.5.1 The threads shall have a smooth finish and be free from flaws and other defects, such as fins, nicks and burrs, that would make them unsuitable for the purpose intended.

5.5.2 Workmanship shall be consistent with the tolerances specified herein. Surface texture of threads produced to this standard shall not exceed 100 microinch arithmetical average roughness ( $R_a$ ) for cut threads and 63 microinch ( $R_a$ ) for rolled and ground threads in accordance with ANSI/ASME B46.1.

NOTE: Coarse and fine pitch threads with rough surface texture are more likely to cross-thread. Threads with chamfered entering ends have the least tendency to cross-thread when assembled with power tools.



## FED-STD-H28/2B

5.6 Chamfer.

5.6.1 All entering ends of externally threaded fasteners and threaded components shall have 45° chamfers (approximately) from minor diameters or slightly below minor diameters, unless otherwise specified.

5.6.2 All entering ends of internally threaded fasteners and threaded components shall have nominal 90° -120° countersinks to or slightly greater than the thread major diameters, unless otherwise specified.

5.7 Rolled threads.

5.7.1 Completely formed threads. A completely formed thread follows the thread profile, within the tolerance zone over an axial distance of one pitch (see figure 2.1).

5.7.2 Incomplete formed threads.

5.7.2.1 The lead-in thread is measured from the end of the product to the start of the first complete thread where the major diameter is equal to the minimum allowable major diameter and the thread root is equal to the maximum minor diameter. This should not exceed 2P (see figure 2.2).

5.7.2.2 The run-out thread is measured between the transition point of the product and the first thread root which is completely formed, where the minor diameter equals the maximum permissible minor diameter and the major diameter of the last fully formed thread equals the minimum permissible major diameter. When root radius is specified, the last completely formed root at the minor diameter must meet the requirement. See figure 2.3 for full shank fastener, figure 2.4 for pitch diameter shank fastener, figure 2.5 for shoulder bolt, figure 2.6 for oversize diameter shank fastener and figures 2.7 and 2.8 for threaded to head fasteners.

6. Notes.

6.1 Supersession note. In addition to superseding FED-STD-H28/2A dated 20 April 1984, this document also supersedes Appendix A1 of FED-STD-H28 dated 31 March 1978.

FED-STD-H28/2B

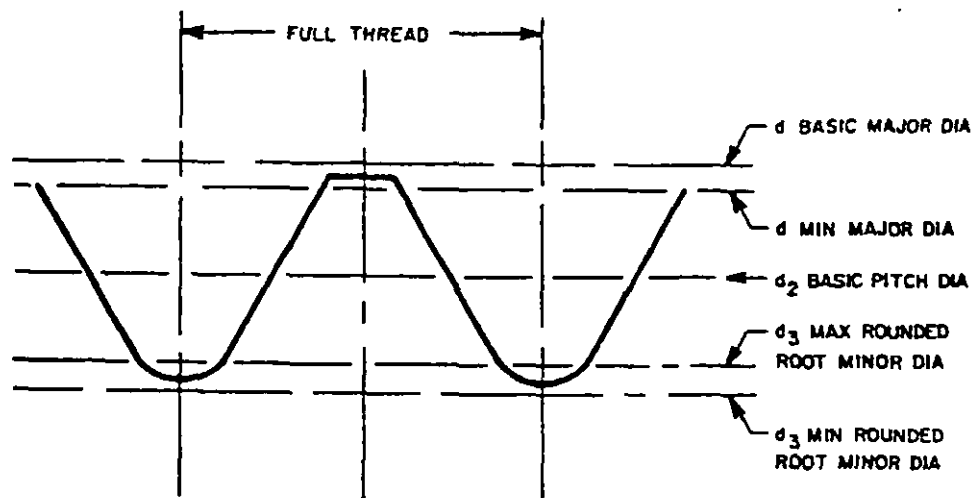


FIGURE 2.1 COMPLETELY FORMED EXTERNAL THREAD

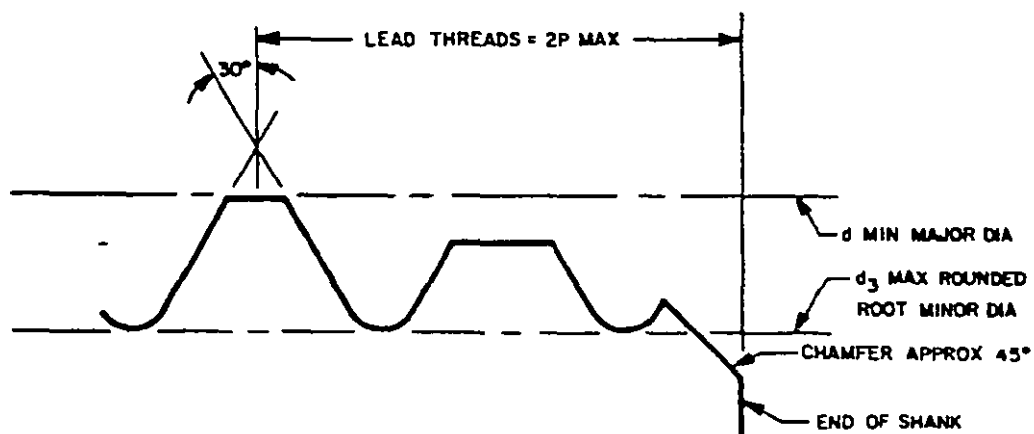


FIGURE 2.2 INCOMPLETE FORMED EXTERNAL THREADS, LEAD-IN THREADS

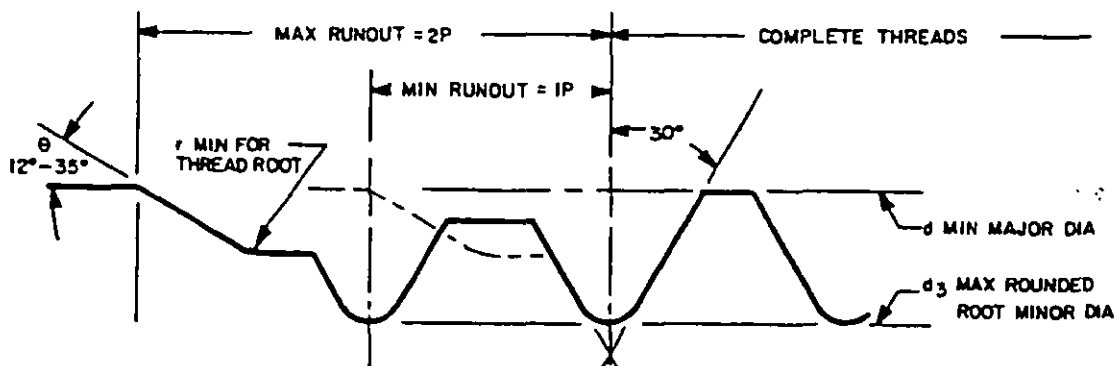


FIGURE 2.3 INCOMPLETE FORMED THREADS, FULL SHANK FASTENER - STANDARD DIAMETER

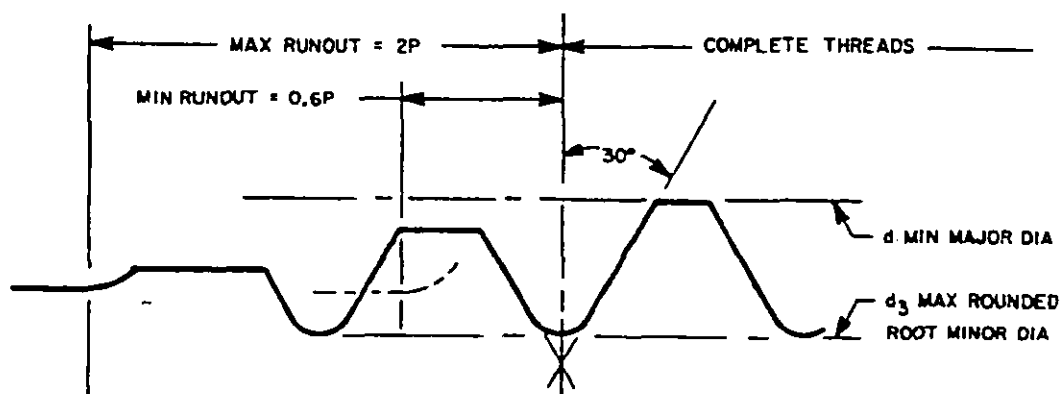


FIGURE 2.4 INCOMPLETE FORMED THREADS, PITCH DIAMETER SHANK FASTENER

FED-STD-H28/2B

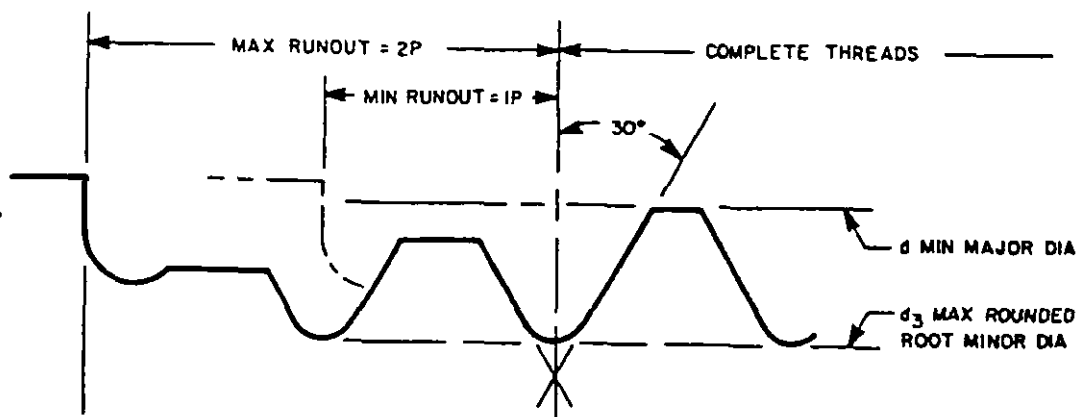
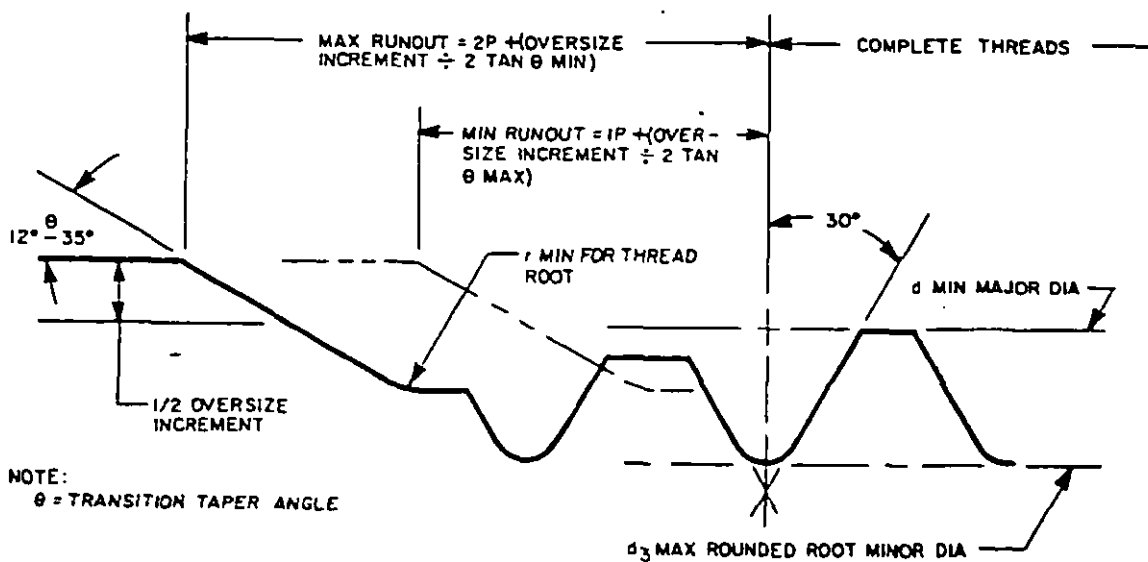


FIGURE 2.5 FULL SHANK FASTENER-STANDARD DIAMETER,  
OPTIONAL CONFIGURATION (SHOULDER BOLT)



NOTE:  
θ = TRANSITION TAPER ANGLE

FIGURE 2.6 FULL SHANK FASTENER-OVERSIZE DIAMETER

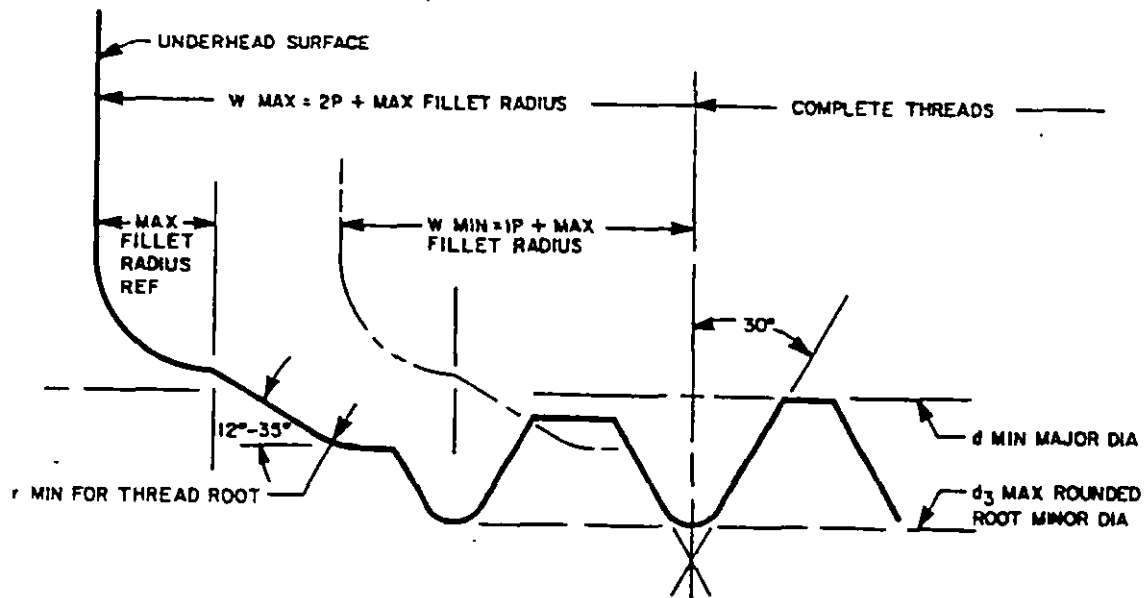


FIGURE 2.7 FULL SHANK FASTENER - THREADED TO HEAD

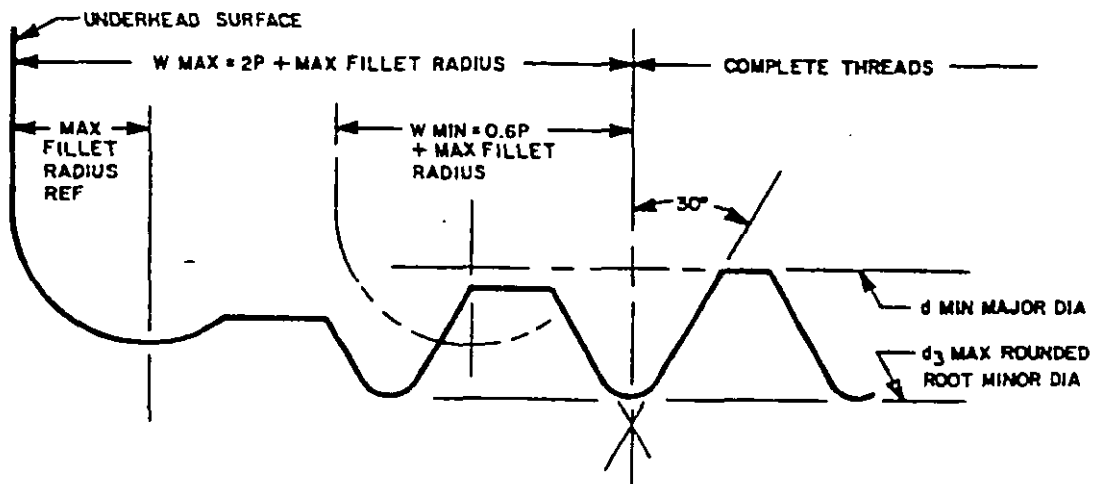


FIGURE 2.8 PITCH DIAMETER SHANK FASTENER - THREADED TO HEAD

FED-STD-H28/2B

## APPENDIX A

## TAP DRILL SIZES AND RECOMMENDED HOLE SIZE LIMITS BEFORE THREADING

10. Scope. This appendix provides suggested tap drill sizes and recommended hole size limits applicable prior to forming internal Unified screw threads. It is not a mandatory part of the standard. The information contained herein is intended for guidance only.

20. Tap drill sizes.

20.1 General. To assure that the minor diameter of an internal thread is held within specified limits, it may be necessary to use a reamer to finish the hole. A variety of factors enters into the production of a clean, round, straight hole of the correct diameter. For a discussion of these and other data on drilling and tapping, reference may be made to "Drilled Holes for Tapping", a publication of the United States Cutting Tool Institute, 1230 Keith Building, Cleveland, OH 44115.

20.2 Tabulated data.

20.2.1 Table II.A.1 gives minor diameter limits and corresponding percentages of thread for all standard series threads up to and including 3.75 inch diameter for classes 1B and 2B. Table II.A.2 is a similar table for class 3B. These tables also list sizes of drills that may be expected to drill holes within or near the specified minor diameter limits. The diameter of the drill, the probable hole size, and the corresponding percentages of thread are tabulated.

20.2.2 As a drill may normally be expected to cut oversize, probable hole sizes are tabulated that are derived from probable mean oversizes, also tabulated. The following is quoted from the above-mentioned report: "... a series of tests was conducted by drill manufacturers. Using six sizes of drills ranging from 1/16" to 1" in diameter, a total of 2,808 holes were drilled in cast iron and steel. Regular high speed steel drills were used with drilling equipment of the type normally found in metal working shops.... The average depth of hole drilled was equal to 1-1/2 times the drill diameter. Measurement of the hole was made at midpoint of the depth drilled.... The average of the...amounts oversize...shows a marked increase in amount oversize for drills larger than 3/4". For this size range reaming is recommended."

20.2.3 Percent of thread listed in tables is the ratio in percent of the actual height of thread to the value  $0.75H$ ; this value is the basic thread height of the obsolete American National Thread Profile. Since the basic height of a Unified Thread Profile is  $0.625H$ , the maximum percent thread permissible is 83.3%. Due to allowances for drills to cut oversize or due to lack of availability of drills within specified minor diameter limits, tap drills listed in tables II.A.1 and II.A.2 may show greater than 83.3% threads. This indicates that the drill size is smaller than the minimum thread minor diameter and additional machining of the hole may be necessary in order to permit economical tapping.

### 30. Recommended hole size limits before threading.

30.1 General. For short length of engagement, the hole diameter required prior to threading should be held near the minimum limit to maximize thread height for maximum joint strength. As length of engagement increases, it is advantageous to increase the hole diameter for more economical tapping with less risk of tap breakage. Therefore, the following recommendations were developed (also see 30.2 below):

| <u>Length of Engagement</u> | <u>Minimum Hole Size</u>                      | <u>Maximum Hole Size</u>                                    |
|-----------------------------|---|---|
| Up to and including 0.33D   | Minimum minor dia                             | Min minor dia plus<br>1/2 minor dia tolerance               |
| Above 0.33D thru 0.67D      | Min minor dia plus<br>1/4 minor dia tolerance | Min minor dia plus<br>3/4 minor dia tolerance               |
| Above 0.67D thru 1.5D       | Min minor dia plus<br>1/2 minor dia tolerance | Max minor dia (min minor<br>dia plus tolerance)             |
| Above 1.5D thru 3.0D        | Min minor dia plus<br>3/4 minor dia tolerance | Max minor dia plus 1/4<br>minor dia tolerance<br>(see 30.2) |

From the foregoing it will be seen that the difference between limits in each range is the same and equal to half of the minor diameter tolerance. This is a general rule. However, the minimum differences for sizes below 0.25 in. are equal to the minor diameter tolerances given in tables 39 and 40 in ASME B1.1-1989 for lengths of engagement to and including 0.33D. For lengths of engagement greater than 0.33D for sizes 0.25 in. and larger, the minimum values are adjusted so that the difference between limits is never less than 0.0040 in.

FED-STD-H28/2B

30.2 Tabulated data. Recommended hole size limits for standard Unified threads and some special (UNS) threads are given in tables II.A.3 and II.A.4. For other special threads, calculate in accordance with 30.1 above; use minimum minor diameter and tolerance from table 3B of ASME B1.1-1989, or calculate in accordance with section 8 of ASME B1.1-1989 using appropriate tolerance from table 39 or 40 of ASME B1.1-1989 for tolerance ratio of 1 or from formulas in paragraph 5.8.2 of ASME B1.1-1989. Tabulated hole sizes and hole sizes calculated in accordance with 30.1 are not mandatory unless the thread designation states the modified minor diameter limits and the designation MOD in accordance with paragraph 6.7 in ASME B1.1-1989. If modified minor diameter limits are not specified, acceptance will be in accordance with standard minor diameter limits.

NOTE: Recommended maximum hole sizes in 30.1, for lengths of engagement greater than  $1.5D$  are outside standard minor diameter limits. They are not included in tables II.A.3 and II.A.4. Use of a minor diameter larger than standard will result in a reduction in shear area of the external threads of the mating part. If manufacturing process permits, maximum hole size before threading should be maintained at the high end of the standard minor diameter limits.

30.3 Other considerations. When tapping relatively soft materials, especially with fine pitch threads, there is a tendency for the material to be squeezed down towards the root of the tap so that the minor diameter of the tapped hole may become smaller than the diameter of the drilled hole. It may be necessary to try a different size drill or different style tap to assure a satisfactory thread.



TABLE II.A.1 - Tap drill sizes, Unified screw threads, classes 1B and 2B

| Thread size | Threads per inch | Designation | Classes 1B and 2B minor diameter, internal threads |                   |         | Tap drills and percent of thread |            |       |                         |                    |                   |       |      |
|-------------|------------------|-------------|--|-------------------|---------|----------------------------------|------------|-------|-------------------------|--------------------|-------------------|-------|------|
|             |                  |             | Minimum  | Percent of thread | Maximum | Percent of thread                | Drill size |       | Probable oversize, mean | Probable hole size | Percent of thread |       |      |
| .060        | 80               | UNF         | .0465  | 83.1              | .0514   | 53.0                             | in         | .0465 | .0015                   | 83                 | in                | .0480 | 74   |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       |      |
| .073        | 64               | UNC         | .0561  | 83.3              | .0623   | 52.7                             | in         | .0550 | .0015                   | 89                 | .0565             | 81    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 5/32 |
| .073        | 72               | UNF         | .0580  | 83.1              | .0635   | 52.7                             | 1/16       | .0625 | .0015                   | 58                 | .0640             | 50    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       |      |
| .086        | 56               | UNC         | .0667  | 83.2              | .0737   | 53.0                             | in         | .0670 | .0017                   | 82                 | .0687             | 75    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 5/32 |
| .086        | 64               | UNF         | .0691  | 83.3              | .0753   | 52.7                             | in         | .0730 | .0017                   | 56                 | .0747             | 49    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 5/32 |
| .099        | 48               | UNC         | .0764  | 83.5              | .0845   | 53.6                             | in         | .0760 | .0019                   | 85                 | .0779             | 78    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 5/64 |
| .099        | 56               | UNF         | .0797  | 83.2              | .0865   | 53.9                             | in         | .0810 | .0019                   | 67                 | .0829             | 60    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 3/32 |
| .112        | 40               | UNC         | .0849  | 83.4              | .0939   | 55.7                             | in         | .0860 | .0019                   | 80                 | .0879             | 74    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 7/32 |
| .112        | 48               | UNF         | .0894  | 83.5              | .0968   | 56.2                             | in         | .0890 | .0020                   | 56                 | .0958             | 50    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 1/2  |
| .125        | 40               | UNC         | .0979  | 83.4              | .1062   | 57.9                             | in         | .0980 | .0023                   | 83                 | .1003             | 76    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 7/32 |
| .125        | 44               | UNF         | .1004  | 83.3              | .1079   | 57.9                             | in         | .1015 | .0023                   | 72                 | .1038             | 65    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 1/2  |
| .138        | 32               | UNC         | .104   | 83.8              | .114    | 59.1                             | in         | .1065 | .0023                   | 63                 | .1088             | 55    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 1/2  |
| .138        | 32               | UNC         | .104   | 83.8              | .114    | 59.1                             | in         | .1065 | .0026                   | 62                 | .1156             | 55    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 7/64 |
| .138        | 32               | UNC         | .104   | 83.8              | .114    | 59.1                             | in         | .1110 | .0026                   | 67                 | .1136             | 60    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 1/2  |
| .138        | 32               | UNC         | .104   | 83.8              | .114    | 59.1                             | in         | .1130 | .0026                   | 62                 | .1156             | 55    |      |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    |                   |       | 1/2  |

1/100th of thread = 0.75H (see 20.2.3).

TABLE II.A.1 - Tap drill sizes, Unified screw threads, classes 1B and 2B - Continued

| Thread size | Threads per inch | Designation | Classes 1B and 2B minor diameter, Internal threads |                   |         | Tap drills and percent of thread |                             |             |                   |                         |                    |                   |      |      |                              |                    |             |             |       |
|-------------|------------------|-------------|--|-------------------|---------|----------------------------------|-----------------------------|-------------|-------------------|-------------------------|--------------------|-------------------|------|------|------------------------------|--------------------|-------------|-------------|-------|
|             |                  |             | Minimum  | Percent of thread | Maximum | Percent of thread                | Drill size                  |             | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |      |      |                              |                    |             |             |       |
|             |                  |             |  |                   |         |                                  | In                          | In          |                   |                         |                    |                   |      |      |                              |                    |             |             |       |
| .138        | 40               | URF         | .111   | 83.1              | .119    | 58.5                             | In<br>#1<br>#110            | In<br>.0026 | In<br>.1136       | 83                      | 75                 |                   |      |      |                              |                    |             |             |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         |                    | .130              | 83.8 | .139 | 61.6                         | In<br>#29<br>#1360 | In<br>.0029 | In<br>.1389 | 62    |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         |                    |                   |      |      |                              |                    |             |             |       |
| .190        | 24               | URC         | .145   | 83.1              | .156    | 62.8                             | In<br>#27<br>#1440          | In<br>.0032 | In<br>.1472       | 79                      |                    |                   |      |      |                              |                    |             |             |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         | .156               | 83.8              | .164 | 64.0 | In<br>#25<br>#1470           | In<br>.0032        | In<br>.1507 | 74          |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         |                    |                   |      |      |                              |                    |             |             | .177  |
| .216        | 24               | URC         | .171   | 83.1              | .181    | 64.7                             | In<br>#23<br>#1540<br>#5/32 | In<br>.0032 | In<br>.1572       | 61                      |                    |                   |      |      |                              |                    |             |             |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         | .216               | 83.8              | .190 | 64.0 | In<br>#22<br>#1570           | In<br>.0032        | In<br>.1602 | 73          |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         |                    |                   |      |      |                              |                    |             |             | .250  |
| .250        | 20               | URC         | .211   | 84.1              | .220    | 64.7                             | In<br>#17/64<br>#17<br>#170 | In<br>.0035 | In<br>.1754       | 75                      |                    |                   |      |      |                              |                    |             |             |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         | .250               | 83.8              | .224 | 64.0 | In<br>#16<br>#1800           | In<br>.0035        | In<br>.1805 | 60          |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         |                    |                   |      |      |                              |                    |             |             | .250  |
| .3125       | 18               | UNC         | .252   | 83.8              | .265    | 65.8                             | In<br>#14<br>#1820          | In<br>.0035 | In<br>.1835       | 70                      |                    |                   |      |      |                              |                    |             |             |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         | .3125              | 83.9              | .270 | 65.4 | In<br>#13/64<br>#13<br>#2040 | In<br>.0038        | In<br>.1998 | 77          |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         |                    |                   |      |      |                              |                    |             |             | .3125 |
| .250        | 28               | URF         | .216   | 83.8              | .224    | 64.0                             | In<br>#9<br>#1990           | In<br>.0038 | In<br>.1998       | 77                      |                    |                   |      |      |                              |                    |             |             |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         | .250               | 83.1              | .226 | 66.5 | In<br>#8<br>#2010            | In<br>.0038        | In<br>.2028 | 73          |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         |                    |                   |      |      |                              |                    |             |             | .250  |
| .250        | 32               | UNEF        | .220   | 83.1              | .226    | 66.5                             | In<br>#7/32<br>#2188        | In<br>.0038 | In<br>.2226       | 61                      |                    |                   |      |      |                              |                    |             |             |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         | .250               | 83.1              | .226 | 66.5 | In<br>#7/32<br>#2210         | In<br>.0038        | In<br>.2248 | 62          |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         |                    |                   |      |      |                              |                    |             |             | .250  |
| .3125       | 20               | UN          | .258   | 83.9              | .270    | 65.4                             | In<br>#6<br>#2570           | In<br>.0038 | In<br>.2608       | 72                      |                    |                   |      |      |                              |                    |             |             |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         | .3125              | 83.9              | .270 | 65.4 | In<br>#5<br>#2570            | In<br>.0041        | In<br>.2651 | 66          |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         |                    |                   |      |      |                              |                    |             |             | .3125 |
| .3125       | 20               | UN          | .258   | 83.9              | .270    | 65.4                             | In<br>#3<br>#2660           | In<br>.0041 | In<br>.2701       | 65                      |                    |                   |      |      |                              |                    |             |             |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         | .3125              | 83.9              | .270 | 65.4 | In<br>#2<br>#2660            | In<br>.0041        | In<br>.2701 | 73          |       |
|             |                  |             |  |                   |         |                                  |                             |             |                   |                         |                    |                   |      |      |                              |                    |             |             | .3125 |

1/ 100% of thread = 0.75H (see 20.2.3).

TABLE II.A.1 - Tap drill sizes, Unified screw threads, classes 1B and 2B - Continued

| Thread size | Threads per inch | Designation | Classes 1B and 2B minor diameter, internal threads |                   |         | Tap drills and percent of thread |  |    |                   |                         |                    |                   |
|-------------|------------------|-------------|--|-------------------|---------|----------------------------------|--|----|-------------------|-------------------------|--------------------|-------------------|
|             |                  |             | Minimum  | Percent of thread | Maximum | Percent of thread                | Drill size   |    | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |
|             |                  |             |  |                   |         |                                  | In   | In |                   |                         |                    |                   |
| .3125       | 24               | UNF         | .267   | 84.1              | .277    | 65.6                             | {<br>R<br>L<br>J<br>J<br>K<br>9/32<br>}<br>In<br>.2660<br>.2720<br>.2770<br>.2770<br>.2810<br>.2812<br>}   | 86 | .0041             | .2701                   | 70                 |                   |
| .3125       | 28               | UN          | .274   | 83.0              | .282    | 65.7                             | {<br>K<br>9/32<br>7.25 mm<br>}<br>In<br>.2810<br>.2812<br>.2854<br>}   | 78 | .0042             | .2852                   | 67                 |                   |
| .3125       | 32               | UNEF        | .279   | 82.5              | .286    | 65.3                             | {<br>O<br>P<br>Q<br>Q<br>R<br>R<br>R<br>11/32<br>11/32<br>S<br>S<br>}<br>In<br>.3125<br>.3160<br>.3230<br>.3230<br>.3320<br>.3320<br>.3390<br>.3390<br>.3438<br>.3438<br>.3480<br>.3480<br>} | 77 | .0044             | .3169                   | 72                 |                   |
| .3125       | 36               | UNS         | .282   | 84.5              | .289    | 65.1                             | {<br>T<br>23/64<br>3/8<br>V<br>W<br>25/64<br>Y<br>Y<br>13/32<br>}<br>In<br>.321<br>.332<br>.340<br>.345<br>.349<br>.352<br>}   | 73 | .0044             | .3204                   | 67                 |                   |
| .375        | 16               | UNC         | .307   | 83.8              | .321    | 66.5                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3160<br>.3230<br>.3320<br>.3320<br>.3390<br>.3390<br>.3438<br>.3438<br>.3480<br>.3480<br>}                                 | 80 | .0044             | .3274                   | 73                 |                   |
| .375        | 20               | UN          | .321   | 83.1              | .332    | 66.2                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3230<br>.3320<br>.3320<br>.3390<br>.3390<br>.3438<br>.3438<br>.3480<br>.3480<br>}  | 79 | .0044             | .3364                   | 59                 |                   |
| .375        | 24               | UNF         | .330   | 83.1              | .340    | 64.7                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3320<br>.3390<br>.3390<br>.3438<br>.3438<br>.3480<br>.3480<br>}  | 77 | .0044             | .3434                   | 58                 |                   |
| .375        | 28               | UN          | .336   | 84.1              | .345    | 64.7                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3390<br>.3390<br>.3438<br>.3438<br>.3480<br>.3480<br>}   | 78 | .0044             | .3434                   | 68                 |                   |
| .375        | 32               | UNEF        | .341   | 83.8              | .349    | 64.0                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3438<br>.3438<br>.3480<br>.3480<br>}   | 67 | .0045             | .3483                   | 58                 |                   |
| .375        | 36               | UNS         | .345   | 83.1              | .352    | 63.7                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3480<br>.3480<br>}   | 75 | .0045             | .3525                   | 55                 |                   |
| .4375       | 14               | UNC         | .360   | 83.5              | .376    | 66.3                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3580<br>.3594<br>.3750<br>.3770<br>.3860<br>.3906<br>.4040<br>.4040<br>.4062<br>}  | 86 | .0046             | .3626                   | 81                 |                   |
| .4375       | 16               | UN          | .370   | 83.1              | .384    | 65.9                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3594<br>.3750<br>.3770<br>.3860<br>.3906<br>.4040<br>.4040<br>.4062<br>}   | 84 | .0046             | .3640                   | 79                 |                   |
| .4375       | 20               | UNF         | .383   | 83.9              | .395    | 65.4                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3750<br>.3770<br>.3860<br>.3906<br>.4040<br>.4040<br>.4062<br>}  | 77 | .0046             | .3796                   | 71                 |                   |
| .4375       | 28               | UNEF        | .399   | 83.0              | .407    | 65.7                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3770<br>.3860<br>.3906<br>.4040<br>.4040<br>.4062<br>}   | 75 | .0046             | .3816                   | 69                 |                   |
| .4375       | 32               | UN          | .404   | 82.5              | .411    | 65.3                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.3860<br>.3906<br>.4040<br>.4040<br>.4062<br>}  | 72 | .0046             | .3906                   | 72                 |                   |
| .500        | 12               | UNS         | .410   | 83.1              | .428    | 66.5                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.4040<br>.4062<br>}   | 83 | .0046             | .4086                   | 62                 |                   |
| .500        | 13               | UNC         | .417   | 83.1              | .434    | 66.0                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.4062<br>}  | 77 | .0047             | .4108                   | 66                 |                   |
| .500        | 16               | UN          | .432   | 83.8              | .446    | 66.5                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.4108<br>}  | 80 | .0047             | .4177                   | 76                 |                   |
| .500        | 20               | UNF         | .446   | 83.1              | .457    | 66.2                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.4177<br>}  | 72 | .0047             | .4266                   | 68                 |                   |
| .500        | 28               | UNEF        | .462   | 84.1              | .470    | 64.7                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.4266<br>}  | 78 | .0047             | .4266                   | 73                 |                   |
| .500        | 32               | UN          | .466   | 83.8              | .474    | 64.0                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.4266<br>}  | 71 | .0047             | .4422                   | 71                 |                   |
| .5625       | 12               | UNC         | .472   | 83.6              | .490    | 67.0                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.4311<br>}  | 72 | .0047             | .4578                   | 65                 |                   |
| .5625       | 16               | UN          | .495   | 83.1              | .509    | 65.9                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.4311<br>}  | 72 | .0048             | .4736                   | 57                 |                   |
| .5625       | 18               | UNF         | .502   | 83.8              | .515    | 65.8                             | {<br>X<br>27/64<br>7/16<br>29/64<br>15/32<br>15/32<br>}<br>In<br>.4311<br>}  | 77 | .0048             | .4736                   | 65                 |                   |

1/1008 of thread = 0.75H (see 20.2.3).

TABLE II.A.1 - Tap drill sizes, Unified screw threads, classes 1B and 2B - Continued

| Thread size | Threads per inch | Designation | Classes 1B and 2B minor diameter, Internal threads |                   |         | Tap drills and percent of thread |            |       |                         |                    |                   |       |       |    |
|-------------|------------------|-------------|--|-------------------|---------|----------------------------------|------------|-------|-------------------------|--------------------|-------------------|-------|-------|----|
|             |                  |             | Minimum  | Percent of thread | Maximum | Percent of thread                | Drill size |       | Probable oversize, mean | Probable hole size | Percent of thread |       |       |    |
|             |                  |             |  |                   |         |                                  | In         | In    |                         |                    |                   |       |       |    |
| .5625       | 20               | UN          | .508   | 83.9              | .520    | 65.4                             | .5156      | .5156 | .0048                   | .5204              | 72                | .0048 | .5204 | 65 |
| .5625       | 24               | UNEF        | .517   | 84.1              | .527    | 65.6                             | .5203      | .5156 | .0048                   | .5204              | 87                | .0048 | .5204 | 78 |
| .5625       | 28               | UN          | .524   | 83.0              | .532    | 65.7                             | .5312      | .5203 | .0048                   | .5251              | 67                | .0049 | .5361 | 57 |
| .5625       | 32               | UN          | .529   | 82.5              | .536    | 65.3                             | .5263      | .5312 | .0049                   | .5312              | 77                | .0049 | .5361 | 65 |
| .625        | 11               | UNC         | .527   | 83.0              | .546    | 66.9                             | .5312      | .5312 | .0049                   | .5361              | 79                | .0049 | .5361 | 75 |
| .625        | 12               | UN          | .535   | 83.1              | .553    | 66.5                             | .5469      | .5469 | .0049                   | .5518              | 72                | .0049 | .5518 | 68 |
| .625        | 16               | UN          | .557   | 83.8              | .571    | 66.5                             | .5687      | .5674 | .0049                   | .5674              | 77                | .0049 | .5674 | 71 |
| .625        | 18               | UNF         | .565   | 83.1              | .578    | 65.1                             | .5687      | .5687 | .0049                   | .5736              | 69                | .0049 | .5736 | 63 |
| .625        | 20               | UN          | .571   | 83.1              | .582    | 66.2                             | .5687      | .5687 | .0049                   | .5736              | 87                | .0049 | .5736 | 80 |
| .625        | 24               | UNEF        | .580   | 83.1              | .590    | 64.7                             | .5781      | .5781 | .0049                   | .5830              | 78                | .0049 | .5830 | 71 |
| .625        | 28               | UN          | .586   | 84.1              | .595    | 64.7                             | .5828      | .5828 | .0049                   | .5877              | 87                | .0049 | .5877 | 65 |
| .625        | 32               | UN          | .591   | 83.8              | .599    | 64.0                             | .5938      | .5938 | .0049                   | .5987              | 67                | .0049 | .5987 | 57 |
| .6875       | 12               | UN          | .597   | 83.6              | .615    | 67.0                             | .5938      | .5938 | .0049                   | .5987              | 87                | .0049 | .5987 | 65 |
| .6875       | 16               | UN          | .620   | 83.1              | .634    | 65.9                             | .6094      | .6094 | .0050                   | .6143              | 72                | .0050 | .6143 | 82 |
| .6875       | 20               | UN          | .633   | 83.9              | .645    | 65.4                             | .6250      | .6250 | .0050                   | .6300              | 77                | .0050 | .6300 | 68 |
| .6875       | 24               | UNEF        | .642   | 84.1              | .652    | 65.6                             | .6406      | .6406 | .0050                   | .6456              | 72                | .0050 | .6456 | 71 |
| .6875       | 28               | UN          | .649   | 83.0              | .657    | 65.7                             | .6406      | .6406 | .0050                   | .6456              | 87                | .0050 | .6456 | 65 |
| .6875       | 32               | UN          | .654   | 82.5              | .661    | 65.3                             | .6562      | .6562 | .0050                   | .6612              | 67                | .0050 | .6612 | 57 |
| .750        | 10               | UNC         | .642   | 83.1              | .663    | 67.0                             | .6406      | .6406 | .0050                   | .6456              | 84                | .0050 | .6456 | 80 |
| .750        | 12               | UN          | .660   | 83.1              | .678    | 66.5                             | .6562      | .6562 | .0050                   | .6612              | 72                | .0050 | .6612 | 68 |
| .750        | 16               | UNF         | .682   | 83.8              | .696    | 66.5                             | .6719      | .6719 | .0050                   | .6769              | 87                | .0050 | .6769 | 82 |
| .750        | 20               | UNEF        | .696   | 83.1              | .707    | 66.2                             | .6875      | .6875 | .0050                   | .6925              | 72                | .0050 | .6925 | 68 |
| .750        | 28               | UN          | .711   | 84.1              | .720    | 64.7                             | .7031      | .7031 | .0051                   | .7082              | 77                | .0051 | .7082 | 71 |
| .750        | 32               | UN          | .716   | 83.8              | .724    | 64.0                             | .7188      | .7188 | .0051                   | .7239              | 67                | .0051 | .7239 | 64 |
| .8125       | 12               | UN          | .722   | 83.6              | .740    | 67.0                             | .7344      | .7344 | .0051                   | .7395              | 72                | .0051 | .7395 | 67 |
| .8125       | 16               | UN          | .745   | 83.1              | .759    | 65.9                             | .7500      | .7500 | .0052                   | .7552              | 77                | .0052 | .7552 | 71 |
| .8125       | 20               | UNEF        | .758   | 83.9              | .770    | 65.4                             | .7656      | .7656 | .0052                   | .7708              | 72                | .0052 | .7708 | 64 |
| .8125       | 28               | UN          | .774   | 83.0              | .782    | 65.7                             | .7812      | .7812 | .0052                   | .7864              | 67                | .0052 | .7864 | 56 |
| .8125       | 32               | UN          | .779   | 82.5              | .786    | 65.3                             | .7812      | .7812 | .0052                   | .7864              | 77                | .0052 | .7864 | 64 |
| .875        | 9                | UNC         | .755   | 83.1              | .778    | 67.2                             | .7656      | .7656 | .0052                   | .7708              | 76                | .0052 | .7708 | 72 |
| .875        | 12               | UN          | .785   | 83.1              | .803    | 66.5                             | .7812      | .7812 | .0052                   | .7864              | 87                | .0052 | .7864 | 82 |
| .875        | 14               | UNF         | .798   | 83.0              | .814    | 65.7                             | .7969      | .7969 | .0052                   | .8021              | 72                | .0052 | .8021 | 67 |
|             |                  |             |  |                   |         |                                  | .8024      | .8024 | .0052                   | .8076              | 84                | .0052 | .8076 | 67 |
|             |                  |             |  |                   |         |                                  | .8125      | .8125 | .0052                   | .8177              | 78                | .0052 | .8177 | 73 |
|             |                  |             |  |                   |         |                                  |            |       |                         |                    | 67                |       |       | 62 |

1/100 of thread = 0.75H (see 20.2.3).

TABLE II.A.1 - Tap drill sizes, Unified screw threads, classes 1B and 2B - Continued

| Thread size | Threads per inch | Designation | Classes 1B and 2B minor diameter, internal threads |                   |         |                   | Tap drills and percent of thread |        |                   |                         |                    |                   |    |
|-------------|------------------|-------------|--|-------------------|---------|-------------------|----------------------------------|--------|-------------------|-------------------------|--------------------|-------------------|----|
|             |                  |             | Minimum  | Percent of thread | Maximum | Percent of thread | Drill size                       |        | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |    |
|             |                  |             |  |                   |         |                   | In                               | In     |                   |                         |                    |                   |    |
| In .875     | 16               | UN          | .807   | 83.8              | .821    | 66.5              | 13/16                            | .8125  | .0053             | .8178                   | 77                 | .8178             | 70 |
| .875        | 20               | UNEF        | .821   | 83.1              | .832    | 66.2              | 53/64                            | .8281  | .0054             | .8335                   | 72                 | .8335             | 64 |
| .875        | 28               | UN          | .836   | 84.1              | .845    | 64.7              | 27/32                            | .8438  | .0055             | .8493                   | 67                 | .8493             | 55 |
| .875        | 32               | UN          | .841   | 83.8              | .849    | 64.0              | 27/32                            | .8438  | .0055             | .8493                   | 77                 | .8493             | 63 |
| .9375       | 12               | UN          | .847   | 83.6              | .865    | 67.0              | 27/32                            | .8438  | .0055             | .8493                   | 87                 | .8493             | 81 |
| .9375       | 16               | UN          | .870   | 83.1              | .884    | 65.9              | 55/64                            | .8594  | .0056             | .8650                   | 72                 | .8650             | 67 |
| .9375       | 20               | UNEF        | .883   | 83.9              | .895    | 65.4              | 7/8                              | .8750  | .0057             | .8807                   | 77                 | .8807             | 70 |
| .9375       | 28               | UN          | .899   | 83.0              | .907    | 65.7              | 57/64                            | .8906  | .0059             | .8965                   | 72                 | .8965             | 63 |
| .9375       | 32               | UN          | .904   | 82.5              | .911    | 65.3              | 29/32                            | .9062  | .0060             | .9122                   | 67                 | .9122             | 55 |
| 1.000       | 8                | UNC         | .865   | 83.1              | .890    | 67.7              | 55/64                            | .8594  | .0059             | .8653                   | 87                 | .8653             | 83 |
| 1.000       | 12               | UNF         | .910   | 83.1              | .928    | 66.5              | 29/32                            | .9062  | .0060             | .9122                   | 87                 | .9122             | 73 |
| 1.000       | 14               | UNF         | .923   | 83.0              | .938    | 66.8              | 59/64                            | .9219  | .0060             | .9279                   | 72                 | .9279             | 81 |
| 1.000       | 16               | UN          | .932   | 83.8              | .946    | 66.5              | 0.9274                           | .9274  | .0061             | .9335                   | 84                 | .9335             | 78 |
| 1.000       | 20               | UNEF        | .946   | 83.1              | .957    | 66.2              | 15/16                            | .9375  | .0062             | .9437                   | 77                 | .9437             | 72 |
| 1.000       | 28               | UN          | .961   | 84.1              | .970    | 64.7              | 61/64                            | .9531  | .0063             | .9594                   | 72                 | .9594             | 69 |
| 1.000       | 32               | UN          | .966   | 83.8              | .974    | 64.0              | 31/32                            | .9688  | .0065             | .9753                   | 67                 | .9753             | 63 |
| 1.0625      | 8                | UN          | .927   | 83.4              | .952    | 68.0              | 59/64                            | .9219  | .0060             | .9279                   | 87                 | .9279             | 83 |
| 1.0625      | 12               | UN          | .972   | 83.6              | .990    | 67.0              | 0.9274                           | .9274  | .0061             | .9335                   | 83                 | .9335             | 79 |
| 1.0625      | 16               | UN          | .995   | 83.1              | 1.009   | 65.9              | 15/16                            | .9375  | .0062             | .9437                   | 77                 | .9437             | 73 |
| 1.0625      | 18               | UNEF        | 1.002  | 83.8              | 1.015   | 65.8              | 31/32                            | .9688  | .0065             | .9753                   | 87                 | .9753             | 81 |
| 1.0625      | 20               | UN          | 1.008  | 83.9              | 1.020   | 65.4              | 63/64                            | .9844  | .0067             | .9911                   | 72                 | .9911             | 66 |
| 1.0625      | 28               | UN          | 1.024  | 83.0              | 1.032   | 65.7              | 1                                | 1.0000 | .0069             | 1.0069                  | 87                 | 1.0069            | 68 |
| 1.125       | 7                | UNC         | .970   | 83.5              | .998    | 68.4              | 1                                | 1.0000 | .0070             | 1.0226                  | 72                 | 1.0226            | 61 |
| 1.125       | 8                | UN          | .990   | 83.1              | 1.015   | 67.7              | 1                                | 1.0312 | .0071             | 1.0383                  | 67                 | 1.0383            | 52 |
| 1.125       | 12               | UNF         | 1.035  | 83.1              | 1.053   | 66.5              | 31/32                            | .9688  | .0062             | .9750                   | 84                 | .9750             | 81 |
| 1.125       | 16               | UN          | 1.057  | 83.8              | 1.071   | 66.5              | 63/64                            | .9844  | .0067             | .9911                   | 76                 | .9911             | 72 |
| 1.125       | 18               | UNEF        | 1.065  | 83.1              | 1.078   | 65.1              | 1                                | 1.0000 | .0069             | 1.0069                  | 87                 | 1.0069            | 73 |
| 1.125       | 20               | UN          | 1.071  | 83.1              | 1.082   | 66.2              | 1                                | 1.0312 | .0072             | 1.0383                  | 77                 | 1.0383            | 80 |
| 1.125       | 28               | UN          | 1.086  | 84.1              | 1.095   | 64.7              | 1                                | 1.0469 | .0074             | 1.0541                  | 72                 | 1.0541            | 65 |
| 1.1875      | 8                | UN          | 1.052  | 83.4              | 1.077   | 68.0              | 1                                | 1.0625 | .0074             | 1.0699                  | 87                 | 1.0699            | 68 |
| 1.1875      | 12               | UN          | 1.097  | 83.6              | 1.115   | 67.0              | 1                                | 1.0825 | .0074             | 1.0899                  | 77                 | 1.0899            | 77 |
| 1.1875      | 16               | UN          | 1.120  | 83.1              | 1.134   | 65.9              | 1                                | 1.0938 | .0074             | 1.1011                  | 67                 | 1.1011            | 77 |

1/ 100% of thread = 0.75H (see 20.2.3).

TABLE II.A.1 - Tap drill sizes, Unified screw threads, classes 1B and 2B - Continued

| Thread size | Threads per inch | Designation | Classes 1B and 2B minor diameter, internal threads |                   |         | Tap drills and percent of thread |            |        |                   |                         |                    |                   |
|-------------|------------------|-------------|--|-------------------|---------|----------------------------------|------------|--------|-------------------|-------------------------|--------------------|-------------------|
|             |                  |             | Minimum  | Percent of thread | Maximum | Percent of thread                | Drill size |        | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |
| 1.1875      | 18               | UNEP        | 1.127  | 83.8              | 1.140   | 65.8                             | 1.1250     | 1.178  | 87                |                         |                    |                   |
| 1.1875      | 20               | UN          | 1.133  | 83.9              | 1.145   | 65.4                             | 1.1406     | 1.1964 | 65                |                         |                    |                   |
| 1.1875      | 28               | UN          | 1.149  | 83.0              | 1.157   | 65.7                             | 1.1562     | 1.2132 | 67                |                         |                    |                   |
| 1.250       | 7                | UNC         | 1.095  | 83.5              | 1.123   | 68.4                             | 1.0938     | 1.332  | 84                |                         |                    |                   |
| 1.250       | 8                | UN          | 1.115  | 83.1              | 1.140   | 67.7                             | 1.1250     | 1.178  | 77                |                         |                    |                   |
| 1.250       | 12               | UNF         | 1.160  | 83.1              | 1.178   | 66.5                             | 1.1562     | 1.1719 | 72                |                         |                    |                   |
| 1.250       | 16               | UN          | 1.182  | 83.0              | 1.196   | 66.5                             | 1.1875     | 1.1875 | 77                |                         |                    |                   |
| 1.250       | 18               | UNEP        | 1.190  | 83.1              | 1.203   | 65.1                             | 1.1875     | 1.1875 | 87                |                         |                    |                   |
| 1.250       | 20               | UN          | 1.196  | 83.1              | 1.207   | 66.2                             | 1.2031     | 1.2031 | 65                |                         |                    |                   |
| 1.250       | 28               | UN          | 1.211  | 84.1              | 1.220   | 64.7                             | 1.2031     | 1.2031 | 72                |                         |                    |                   |
| 1.3125      | 8                | UN          | 1.177  | 83.4              | 1.202   | 68.0                             | 1.1719     | 1.1719 | 87                |                         |                    |                   |
| 1.3125      | 12               | UN          | 1.222  | 83.6              | 1.240   | 67.0                             | 1.1875     | 1.1875 | 77                |                         |                    |                   |
| 1.3125      | 16               | UN          | 1.245  | 83.1              | 1.259   | 65.9                             | 1.2188     | 1.2188 | 87                |                         |                    |                   |
| 1.3125      | 18               | UNEP        | 1.252  | 83.8              | 1.265   | 65.8                             | 1.2344     | 1.2344 | 72                |                         |                    |                   |
| 1.3125      | 20               | UN          | 1.258  | 83.9              | 1.270   | 65.4                             | 1.2500     | 1.2500 | 87                |                         |                    |                   |
| 1.3125      | 28               | UN          | 1.274  | 83.0              | 1.282   | 65.7                             | 1.2656     | 1.2656 | 65                |                         |                    |                   |
| 1.375       | 6                | UNC         | 1.195  | 83.1              | 1.225   | 69.3                             | 1.1875     | 1.1875 | 87                |                         |                    |                   |
| 1.375       | 8                | UN          | 1.240  | 83.1              | 1.265   | 67.7                             | 1.2031     | 1.2031 | 79                |                         |                    |                   |
| 1.375       | 12               | UNF         | 1.285  | 83.1              | 1.303   | 66.5                             | 1.2188     | 1.2188 | 72                |                         |                    |                   |
| 1.375       | 16               | UN          | 1.307  | 83.8              | 1.321   | 66.5                             | 1.2344     | 1.2344 | 87                |                         |                    |                   |
| 1.375       | 18               | UNEP        | 1.315  | 83.1              | 1.328   | 65.1                             | 1.2500     | 1.2500 | 77                |                         |                    |                   |
| 1.375       | 20               | UN          | 1.321  | 83.1              | 1.332   | 66.2                             | 1.2656     | 1.2656 | 65                |                         |                    |                   |
| 1.375       | 28               | UN          | 1.336  | 84.1              | 1.345   | 64.7                             | 1.2812     | 1.2812 | 72                |                         |                    |                   |
| 1.4375      | 6                | UN          | 1.257  | 83.4              | 1.288   | 69.1                             | 1.2500     | 1.2500 | 77                |                         |                    |                   |
| 1.4375      | 8                | UN          | 1.302  | 83.4              | 1.327   | 68.0                             | 1.2656     | 1.2656 | 79                |                         |                    |                   |
| 1.4375      | 12               | UN          | 1.347  | 83.6              | 1.365   | 67.0                             | 1.2812     | 1.2812 | 72                |                         |                    |                   |
| 1.4375      | 16               | UN          | 1.370  | 83.1              | 1.384   | 65.9                             | 1.2969     | 1.2969 | 87                |                         |                    |                   |
| 1.4375      | 18               | UNEP        | 1.377  | 83.8              | 1.390   | 65.8                             | 1.3125     | 1.3125 | 77                |                         |                    |                   |
| 1.4375      | 20               | UN          | 1.383  | 83.9              | 1.395   | 65.4                             | 1.3281     | 1.3281 | 65                |                         |                    |                   |
| 1.4375      | 28               | UN          | 1.399  | 83.0              | 1.407   | 65.7                             | 1.3438     | 1.3438 | 67                |                         |                    |                   |

100% of thread = 0.75H (see 20.2.3).

TABLE II.A.1 - Tap drill sizes, Unified screw threads, classes 1B and 2B - Continued

| Thread size | Threads per inch | Designation | Classes 1B and 2B minor diameter, internal threads |                   |         | Tap drills and percent of thread |            |        |                         |                    |                   |
|-------------|------------------|-------------|--|-------------------|---------|----------------------------------|------------|--------|-------------------------|--------------------|-------------------|
|             |                  |             | Minimum  | Percent of thread | Maximum | Percent of thread                | Drill size |        | Probable oversize, mean | Probable hole size | Percent of thread |
|             |                  |             |  |                   |         |                                  | in         | in     |                         |                    |                   |
| 1.500       | 6                | UNC         | 1.320  | 83.1              | 1.350   | 69.3                             | 1 5/16     | 1.3125 |                         |                    | 87                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.500       | 8                | UN          | 1.365  | 83.1              | 1.390   | 67.7                             | 1 3/8      | 1.3594 |                         |                    | 87                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.500       | 12               | UNF         | 1.410  | 83.1              | 1.428   | 66.5                             | 1 7/16     | 1.4062 |                         |                    | 87                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.500       | 16               | UN          | 1.432  | 83.8              | 1.446   | 66.5                             | 1 1/2      | 1.4375 |                         |                    | 77                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.500       | 18               | UNEF        | 1.440  | 83.1              | 1.452   | 66.5                             | 1 5/8      | 1.4531 |                         |                    | 72                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.500       | 28               | UN          | 1.461  | 84.1              | 1.470   | 64.7                             | 1 1 1/2    | 1.4688 |                         |                    | 67                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.5625      | 6                | UN          | 1.382  | 83.4              | 1.413   | 69.1                             | 1 1/2      | 1.3906 |                         |                    | 79                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.5625      | 8                | UN          | 1.427  | 83.4              | 1.452   | 68.0                             | 1 7/16     | 1.4375 |                         |                    | 77                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.5625      | 12               | UN          | 1.472  | 83.6              | 1.490   | 67.0                             | 1 1 1/2    | 1.4688 |                         |                    | 87                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.5625      | 16               | UN          | 1.495  | 83.1              | 1.509   | 65.9                             | 1 1/2      | 1.4844 |                         |                    | 72                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.5625      | 18               | UNEF        | 1.502  | 83.8              | 1.515   | 65.8                             | 1 1/2      | 1.5000 |                         |                    | 87                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.5625      | 20               | UN          | 1.508  | 83.9              | 1.520   | 65.4                             | 1 3/8      | 1.5156 |                         |                    | 65                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.625       | 6                | UN          | 1.445  | 83.1              | 1.475   | 69.3                             | 1 1/2      | 1.4531 |                         |                    | 79                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.625       | 8                | UN          | 1.490  | 83.1              | 1.515   | 67.7                             | 1 1/2      | 1.4688 |                         |                    | 72                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.625       | 12               | UN          | 1.535  | 83.1              | 1.553   | 66.5                             | 1 7/16     | 1.5312 |                         |                    | 87                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.625       | 16               | UN          | 1.557  | 83.8              | 1.571   | 66.5                             | 1 1 1/2    | 1.5469 |                         |                    | 72                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.625       | 18               | UNEF        | 1.565  | 83.1              | 1.578   | 65.1                             | 1 1/2      | 1.5625 |                         |                    | 87                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.625       | 20               | UN          | 1.571  | 83.1              | 1.582   | 66.2                             | 1 3/8      | 1.5781 |                         |                    | 65                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.6875      | 6                | UN          | 1.507  | 83.4              | 1.538   | 69.1                             | 1 1/2      | 1.5000 |                         |                    | 87                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.6875      | 8                | UN          | 1.552  | 83.4              | 1.577   | 68.0                             | 1 1/2      | 1.5156 |                         |                    | 79                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.6875      | 12               | UN          | 1.597  | 83.6              | 1.615   | 67.0                             | 1 7/16     | 1.5625 |                         |                    | 77                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.6875      | 16               | UN          | 1.620  | 83.1              | 1.634   | 65.9                             | 1 1 1/2    | 1.5938 |                         |                    | 87                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.6875      | 18               | UNEF        | 1.627  | 83.8              | 1.640   | 65.8                             | 1 1/2      | 1.6094 |                         |                    | 72                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.6875      | 20               | UN          | 1.633  | 83.9              | 1.645   | 65.4                             | 1 5/8      | 1.6250 |                         |                    | 87                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.750       | 5                | UNC         | 1.534  | 83.1              | 1.568   | 70.1                             | 1 1/2      | 1.5406 |                         |                    | 65                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.750       | 6                | UN          | 1.570  | 83.1              | 1.600   | 69.3                             | 1 1/2      | 1.5688 |                         |                    | 72                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.750       | 6                | UN          | 1.570  | 83.1              | 1.600   | 69.3                             | 1 1/2      | 1.5469 |                         |                    | 72                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.750       | 6                | UN          | 1.570  | 83.1              | 1.600   | 69.3                             | 1 1/2      | 1.5781 |                         |                    | 79                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |
| 1.750       | 6                | UN          | 1.570  | 83.1              | 1.600   | 69.3                             | 1 1/2      | 1.5938 |                         |                    | 72                |
|             |                  |             |  |                   |         |                                  |            |        |                         |                    |                   |

1/ 100% of thread = 0.75H (see 20.2.3).

TABLE II.A.1 - Tap drill sizes, Unified screw threads, classes 1B and 2B - Continued

| Thread size | Threads per inch | Designation | Classes 1B and 2B minor diameter, internal threads |                   |         | Tap drills and percent of thread |                           |                   |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
|-------------|------------------|-------------|--|-------------------|---------|----------------------------------|---------------------------|-------------------|-------------------------|--------------------|-------------------|--|--|--|--|--|--|--|--|--|--|
|             |                  |             | Minimum  | Percent of thread | Maximum | Percent of thread                | Drill size                | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |  |  |  |  |  |  |  |  |  |  |
| In          |                  |             | In   |                   | In.     |                                  |                           |                   |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.750       | 8                | UN          | 1.615  | 83.1              | 1.640   | 67.7                             | 1.6094<br>1.5/8<br>1.6250 | 87                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.750       | 12               | UN          | 1.660  | 83.1              | 1.678   | 66.5                             | 1.6406<br>1.41/64         | 67                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.750       | 16               | UN          | 1.682  | 83.8              | 1.696   | 66.5                             | 1.6562<br>1.21/32         | 72                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.750       | 20               | UN          | 1.696  | 83.1              | 1.707   | 66.2                             | 1.6719<br>1.43/64         | 77                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.8125      | 6                | UN          | 1.632  | 83.4              | 1.663   | 69.1                             | 1.6875<br>1.11/16         | 87                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.8125      | 0                | UN          | 1.677  | 83.4              | 1.702   | 68.0                             | 1.7031<br>1.45/64         | 72                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.8125      | 12               | UN          | 1.722  | 83.6              | 1.740   | 67.0                             | 1.6250<br>1.5/8           | 77                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.8125      | 16               | UN          | 1.745  | 83.1              | 1.759   | 65.9                             | 1.6406<br>1.41/64         | 87                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.8125      | 20               | UN          | 1.758  | 83.9              | 1.770   | 65.4                             | 1.6562<br>1.21/32         | 77                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.875       | 6                | UN          | 1.695  | 83.1              | 1.725   | 69.3                             | 1.7188<br>1.45/64         | 79                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.875       | 8                | UN          | 1.740  | 83.1              | 1.765   | 67.7                             | 1.7188<br>1.23/32         | 72                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.875       | 12               | UN          | 1.785  | 83.1              | 1.803   | 66.5                             | 1.7500<br>1.3/4           | 77                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.875       | 16               | UN          | 1.807  | 83.8              | 1.821   | 66.5                             | 1.7812<br>1.25/32         | 87                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.875       | 20               | UN          | 1.821  | 83.1              | 1.832   | 66.2                             | 1.7969<br>1.51/64         | 72                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.9375      | 6                | UN          | 1.757  | 83.4              | 1.788   | 69.1                             | 1.8125<br>1.13/16         | 79                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.9375      | 8                | UN          | 1.802  | 83.4              | 1.827   | 68.0                             | 1.7812<br>1.25/32         | 72                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.9375      | 12               | UN          | 1.847  | 83.6              | 1.865   | 67.0                             | 1.8125<br>1.13/16         | 77                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.9375      | 16               | UN          | 1.870  | 83.1              | 1.884   | 65.9                             | 1.8438<br>1.27/32         | 87                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 1.9375      | 20               | UN          | 1.883  | 83.9              | 1.895   | 65.4                             | 1.8125<br>1.13/16         | 72                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 2.000       | 4.5              | UNC         | 1.759  | 83.5              | 1.795   | 71.0                             | 1.8594<br>1.55/64         | 72                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 2.000       | 6                | UN          | 1.820  | 83.1              | 1.850   | 69.3                             | 1.8750<br>1.7/8           | 76                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 2.000       | 8                | UN          | 1.865  | 83.1              | 1.890   | 67.7                             | 1.7812<br>1.25/32         | 79                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 2.000       | 12               | UN          | 1.910  | 83.1              | 1.928   | 66.5                             | 1.8281<br>1.41/64         | 77                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 2.000       | 16               | UN          | 1.932  | 83.8              | 1.946   | 66.5                             | 1.8750<br>1.7/8           | 72                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 2.000       | 20               | UN          | 1.946  | 83.1              | 1.957   | 66.2                             | 1.8906<br>1.57/64         | 77                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |
| 2.0625      | 16               | UNC         | 1.995  | 83.1              | 2.009   | 65.9                             | 1.9219<br>1.59/64         | 72                |                         |                    |                   |  |  |  |  |  |  |  |  |  |  |

1/100% of thread = 0.75H (see 20.2.3).



TABLE II.A.1 - Tap drill sizes, Unified screw threads, classes 1B and 2B - Continued

| Thread size | Threads per inch | Designation | Classes 1B and 2B minor diameter, Internal threads |                   |             | Tap drills and percent of thread |                    |                        |                         |                    |                   |   |         |        |        |         |        |        |         |
|-------------|------------------|-------------|--|-------------------|-------------|----------------------------------|--------------------|------------------------|-------------------------|--------------------|-------------------|---|---------|--------|--------|---------|--------|--------|---------|
|             |                  |             | Minimum  | Percent of thread | Maximum     | Percent of thread                | Drill size         | Percent of thread      | Probable oversize, mean | Probable hole size | Percent of thread |   |         |        |        |         |        |        |         |
| In<br>2.125 | 6                | UN          | In<br>1.945  | 83.1              | In<br>1.975 | 69.3                             | 1 61/64<br>1 31/32 | In<br>1.9531<br>1.9688 | 79<br>72                |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   | 2       | 2 1/32 | 2.0312 | 87      |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         | 2 1/16 | 2.0625 | 77      |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        |         |
| 2.1875      | 16               | URS         | In<br>2.120  | 83.1              | In<br>2.134 | 65.9                             | 2 1/8              | 2.1250                 | 77                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 1/32  | 2.0000 | 87     |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 1/16  | 2.0625 | 76     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 1/16  |
| 2.250       | 4.5              | URC         | In<br>2.090  | 83.5              | In<br>2.045 | 71.0                             | 2 1/8              | 2.0000                 | 87                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 1/32  | 2.100  | 69.3   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 1/16  | 2.140  | 67.7   |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 1/16  |
| 2.250       | 8                | UN          | In<br>2.115  | 83.1              | In<br>2.178 | 66.5                             | 2 5/32             | 2.1562                 | 87                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 1/16  | 2.196  | 66.5   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 3/16  | 2.1875 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 3/16  |
| 2.250       | 20               | UN          | In<br>2.196  | 83.1              | In<br>2.207 | 66.2                             | 2 3/16             | 2.1875                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 1/4   | 2.250  | 77     |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 3/8   | 2.1875 | 87     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 3/8   |
| 2.3125      | 16               | URS         | In<br>2.245  | 83.1              | In<br>2.259 | 65.9                             | 2 1/4              | 2.2500                 | 77                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 3/16  | 2.226  | 68.8   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 1/4   | 2.265  | 67.7   |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 1/4   |
| 2.375       | 8                | UN          | In<br>2.195  | 83.1              | In<br>2.265 | 66.5                             | 58 mm              | 2.2835                 | 85                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 5/16  | 2.3125 | 77     |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 3/8   | 2.3125 | 96     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 3/8   |
| 2.375       | 20               | UN          | In<br>2.321  | 83.1              | In<br>2.332 | 66.2                             | 2 5/16             | 2.3125                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 3/8   | 2.384  | 77     |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 7/32  | 2.2188 | 87     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 7/32  |
| 2.4375      | 16               | URS         | In<br>2.370  | 83.1              | In<br>2.384 | 65.9                             | 2 3/8              | 2.3750                 | 77                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 1/4   | 2.267  | 71.7   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 5/16  | 2.3125 | 87     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 5/16  |
| 2.500       | 6                | UN          | In<br>2.320  | 83.1              | In<br>2.350 | 69.3                             | 2 7/32             | 2.2188                 | 87                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 1/4   | 2.2500 | 77     |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 3/8   | 2.3750 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 3/8   |
| 2.500       | 8                | UN          | In<br>2.365  | 83.1              | In<br>2.390 | 67.7                             | 2 13/32            | 2.4062                 | 87                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 7/16  | 2.446  | 66.5   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 9/16  | 2.5625 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 9/16  |
| 2.500       | 12               | UN          | In<br>2.410  | 83.1              | In<br>2.428 | 66.5                             | 2 7/16             | 2.4375                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 7/16  | 2.457  | 66.2   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 9/16  | 2.5625 | 96     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 9/16  |
| 2.500       | 16               | UN          | In<br>2.432  | 83.8              | In<br>2.446 | 66.5                             | 2 7/16             | 2.4375                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 7/16  | 2.392  | 71.7   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 3/8   | 2.3750 | 87     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 3/8   |
| 2.500       | 20               | UN          | In<br>2.446  | 83.1              | In<br>2.457 | 66.2                             | 2 7/16             | 2.4375                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 7/16  | 2.475  | 69.3   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 9/16  | 2.5000 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 9/16  |
| 2.625       | 4                | UN          | In<br>2.354  | 83.4              | In<br>2.392 | 71.7                             | 2 11/32            | 2.3438                 | 87                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 3/8   | 2.3750 | 77     |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 7/16  | 2.4375 | 87     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 7/16  |
| 2.625       | 6                | UN          | In<br>2.445  | 83.1              | In<br>2.475 | 69.3                             | 2 17/32            | 2.5312                 | 87                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 7/16  | 2.553  | 66.5   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 9/16  | 2.5625 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 9/16  |
| 2.625       | 8                | UN          | In<br>2.490  | 83.1              | In<br>2.515 | 67.7                             | 2 9/16             | 2.5625                 | 87                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 9/16  | 2.571  | 66.5   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 11/16 | 2.6875 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 11/16 |
| 2.625       | 12               | UN          | In<br>2.557  | 83.8              | In<br>2.571 | 66.5                             | 2 11/16            | 2.6875                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 9/16  | 2.582  | 66.2   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 11/16 | 2.6875 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 11/16 |
| 2.625       | 16               | UN          | In<br>2.571  | 83.1              | In<br>2.582 | 66.2                             | 2 11/16            | 2.6875                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 11/16 | 2.517  | 71.7   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 5/8   | 2.6250 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 5/8   |
| 2.750       | 4                | URC         | In<br>2.479  | 83.4              | In<br>2.517 | 71.7                             | 2 1/2              | 2.5000                 | 77                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 1/2   | 2.5625 | 87     |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 5/8   | 2.6250 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 5/8   |
| 2.750       | 6                | UN          | In<br>2.570  | 83.1              | In<br>2.600 | 69.3                             | 2 5/8              | 2.6250                 | 77                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 5/8   | 2.640  | 67.7   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 11/16 | 2.6562 | 87     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 11/16 |
| 2.750       | 8                | UN          | In<br>2.615  | 83.1              | In<br>2.678 | 66.5                             | 2 11/16            | 2.6875                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 11/16 | 2.696  | 66.5   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 11/16 | 2.6875 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 11/16 |
| 2.750       | 12               | UN          | In<br>2.660  | 83.1              | In<br>2.696 | 66.5                             | 2 11/16            | 2.6875                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 11/16 | 2.707  | 66.2   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 11/16 | 2.6875 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 11/16 |
| 2.750       | 16               | UN          | In<br>2.682  | 83.8              | In<br>2.696 | 66.5                             | 2 11/16            | 2.6875                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 11/16 | 2.707  | 66.2   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 11/16 | 2.6875 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 11/16 |
| 2.750       | 20               | UN          | In<br>2.696  | 83.1              | In<br>2.707 | 66.2                             | 2 11/16            | 2.6875                 | 96                      |                    |                   |   |         |        |        |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   | 2 | 2 11/16 | 2.707  | 66.2   |         |        |        |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        | 2 11/16 | 2.6875 | 77     |         |
|             |                  |             |  |                   |             |                                  |                    |                        |                         |                    |                   |   |         |        |        |         |        |        | 2 11/16 |

1/ 100% of thread = 0.75H (see 20.2.3).

FED-STD-H28/2B

TABLE II.A.1 - Tap drill sizes, Unified screw threads, classes 1B and 2B - Continued

| Thread size | Threads per inch | Designation | Classes 1B and 2B minor diameter, Internal threads |                   |          | Tap drills and percent of thread |            |                   |                         |                    |                   |
|-------------|------------------|-------------|--|-------------------|----------|----------------------------------|------------|-------------------|-------------------------|--------------------|-------------------|
|             |                  |             | Minimum  | Percent of thread | Maximum  | Percent of thread                | Drill size | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |
| in          | 4                | UN          | 2.604  | 83.4              | in 2.642 | 71.7                             | in 2.6250  | 77                |                         |                    |                   |
| 2.875       | 6                | UN          | 2.695  | 83.1              | 2.725    | 69.3                             | 2.6875     | 87                |                         |                    |                   |
| 2.875       | 8                | UN          | 2.740  | 83.1              | 2.765    | 67.7                             | 2.7500     | 77                |                         |                    |                   |
| 2.875       | 12               | UN          | 2.785  | 83.1              | 2.803    | 66.5                             | 2.7812     | 87                |                         |                    |                   |
| 2.875       | 16               | UN          | 2.807  | 83.8              | 2.821    | 66.5                             | 2.8125     | 77                |                         |                    |                   |
| 2.875       | 20               | UN          | 2.821  | 83.1              | 2.832    | 66.2                             | 2.8125     | 96                |                         |                    |                   |
| 3.000       | 4                | UNC         | 2.729  | 83.4              | 2.767    | 71.7                             | 2.7500     | 77                |                         |                    |                   |
| 3.000       | 6                | UN          | 2.820  | 83.1              | 2.850    | 69.3                             | 2.8125     | 87                |                         |                    |                   |
| 3.000       | 8                | UN          | 2.865  | 83.1              | 2.890    | 67.7                             | 2.8750     | 77                |                         |                    |                   |
| 3.000       | 12               | UN          | 2.910  | 83.1              | 2.928    | 66.5                             | 2.9134     | 80                |                         |                    |                   |
| 3.000       | 16               | UN          | 2.932  | 83.8              | 2.946    | 66.5                             | 2.9375     | 77                |                         |                    |                   |
| 3.000       | 20               | UN          | 2.946  | 83.1              | 2.957    | 66.2                             | 2.9375     | 96                |                         |                    |                   |
| 3.250       | 4                | UNC         | 2.979  | 83.4              | 3.017    | 71.7                             | 3.0000     | 77                |                         |                    |                   |
| 3.500       | 4                | UNC         | 3.229  | 83.4              | 3.267    | 71.7                             | 3.2500     | 77                |                         |                    |                   |
| 3.750       | 4                | UNC         | 3.479  | 83.4              | 3.517    | 71.7                             | 3.5000     | 77                |                         |                    |                   |

1/ 100% of thread = 0.75H (see 20.2.3).

TABLE II.A.2 - Tap drill sizes, Unified screw threads, class 3B

| Thread size | Threads per inch | Designation | Class 3B minor diameter, internal threads |                   |              | Tap drills and percent of thread |  |                   |                         |                    |                   |    |
|-------------|------------------|-------------|---|-------------------|--------------|----------------------------------|--|-------------------|-------------------------|--------------------|-------------------|----|
|             |                  |             | Minimum                                   | Percent of thread | Maximum      | Percent of thread                | Drill size   | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |    |
| In<br>.060  | 80               | UNF         | In<br>0.0465                              | 83.1              | In<br>0.0514 | 52.9                             | In<br>{ #56<br>3/64  | 0.0465            | 83                      | In<br>0.0415       | 0.0480            | 74 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .073        | 64               | UNC         | .0561                                     | 83.3              | .0623        | 52.7                             | { #54<br>#53<br>#53<br>1/16  | .0550             | 89                      | .0015              | .0565             | 81 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .073        | 72               | UNF         | .0580                                     | 83.1              | .0635        | 52.7                             | { #51<br>#50<br>#50<br>#49   | .0595             | 75                      | .0015              | .0610             | 67 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .086        | 56               | UNC         | .0667                                     | 83.2              | .0737        | 53.0                             | { #51<br>#50<br>#50<br>#49   | .0670             | 82                      | .0017              | .0687             | 75 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .086        | 64               | UNF         | .0691                                     | 83.3              | .0753        | 52.7                             | { #50<br>#49<br>#49  | .0700             | 79                      | .0017              | .0717             | 49 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .099        | 48               | UNC         | .0764                                     | 83.5              | .0845        | 53.6                             | { #48<br>5/64<br>#47<br>#46<br>#45<br>#46<br>#46<br>#45<br>#44               | .0760             | 85                      | .0019              | .0779             | 78 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .099        | 56               | UNF         | .0797                                     | 83.2              | .0865        | 53.9                             | { #48<br>5/64<br>#47<br>#46<br>#45<br>#46<br>#45<br>#44                      | .0810             | 67                      | .0019              | .0829             | 69 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .112        | 40               | UNC         | .0849                                     | 83.4              | .0939        | 55.7                             | { #44<br>#43<br>#42<br>3/32<br>#43<br>#42<br>3/32<br>#41                     | .0860             | 80                      | .0019              | .0879             | 74 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .112        | 48               | UNF         | .0894                                     | 83.5              | .0968        | 56.2                             | { #43<br>#42<br>3/32<br>#41  | .0890             | 85                      | .0020              | .0910             | 78 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .125        | 40               | UNC         | .0979                                     | 83.4              | .1062        | 57.9                             | { #40<br>#39<br>#38<br>#37<br>#38<br>#37<br>#36                              | .0980             | 83                      | .0023              | .1003             | 76 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .125        | 44               | UNF         | .1004                                     | 83.3              | .1079        | 57.9                             | { #40<br>#39<br>#38<br>#37<br>#36  | .0995             | 65                      | .0023              | .1038             | 65 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .138        | 32               | UNC         | .1040                                     | 83.8              | .1140        | 59.1                             | { #37<br>#36<br>7/64<br>#35<br>#34<br>#34<br>#33<br>#34<br>#33<br>#33<br>#32 | .1040             | 84                      | .0023              | .1063             | 78 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .138        | 40               | UNF         | .1110                                     | 83.1              | .1186        | 59.7                             | { #37<br>#36<br>7/64<br>#35<br>#34<br>#34<br>#33<br>#34<br>#33<br>#33<br>#32 | .1040             | 84                      | .0023              | .1063             | 78 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .138        | 40               | UNF         | .1110                                     | 83.1              | .1186        | 59.7                             | { #37<br>#36<br>7/64<br>#35<br>#34<br>#34<br>#33<br>#34<br>#33<br>#33<br>#32 | .1094             | 70                      | .0026              | .1120             | 64 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .138        | 40               | UNF         | .1110                                     | 83.1              | .1186        | 59.7                             | { #37<br>#36<br>7/64<br>#35<br>#34<br>#34<br>#33<br>#34<br>#33<br>#33<br>#32 | .1110             | 83                      | .0026              | .1136             | 75 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |
| .138        | 40               | UNF         | .1110                                     | 83.1              | .1186        | 59.7                             | { #37<br>#36<br>7/64<br>#35<br>#34<br>#34<br>#33<br>#34<br>#33<br>#33<br>#32 | .1160             | 68                      | .0026              | .1186             | 60 |
|             |                  |             |   |                   |              |                                  |  |                   |                         |                    |                   |    |

1/1008 of thread = 0.75H (see 20.2.3).

FED-STD-H28/2B

TABLE II.A.2 - Tap drill sizes, Unified screw threads, class 3B - continued

| Thread size | Threads per inch | Designation | Class 3B minor diameter, internal threads |                   |         | Tap drills and percent of thread |  |   |                            |   |   |                            |
|-------------|------------------|-------------|---|-------------------|---------|----------------------------------|--|---|----------------------------|---|---|----------------------------|
|             |                  |             | Minimum                                   | Percent of thread | Maximum | Percent of thread                | Drill size                             | Percent of thread                         | Probable oversize, mean    | Probable hole size                        | Percent of thread                         |                            |
| .164        | 32               | UNC         | .1300                                     | 83.8              | .1389   | 61.8                             | in<br>#29                              | .1360                                     | 69                         | .0029                                     | .1389                                     | 62                         |
|             |                  |             |   |                   |         |                                  |  |   |                            |   |   |                            |
| .190        | 24               | UNC         | .1450                                     | 83.1              | .1555   | 63.7                             | in<br>#27<br>#26<br>#25<br>#24<br>#23  | .1440<br>.1470<br>.1495<br>.1520<br>.1540 | 85<br>79<br>75<br>70<br>66 | .0032<br>.0032<br>.0032<br>.0032<br>.0032 | .1472<br>.1502<br>.1527<br>.1552<br>.1572 | 79<br>74<br>69<br>64<br>61 |
|             |                  |             |   |                   |         |                                  |  |   |                            |   |   |                            |
| .216        | 24               | URC         | .1710                                     | 83.1              | .1807   | 65.2                             | in<br>11/64<br>#17<br>#16<br>#15       | .1719<br>.1730<br>.1770<br>.1800          | 82<br>79<br>72<br>67       | .0035<br>.0035<br>.0035<br>.0035          | .1754<br>.1765<br>.1805<br>.1835          | 75<br>73<br>66<br>60       |
|             |                  |             |   |                   |         |                                  |  |   |                            |   |   |                            |
| .216        | 32               | UREF        | .1820                                     | 83.8              | .1895   | 65.3                             | in<br>3/16<br>#12                      | .1850<br>.1875<br>.1890                   | 76<br>70<br>67             | .0035<br>.0035<br>.0035                   | .1885<br>.1910<br>.1925                   | 68<br>62<br>58             |
|             |                  |             |   |                   |         |                                  |  |   |                            |   |   |                            |
| .250        | 28               | URF         | .2110                                     | 84.1              | .2190   | 66.8                             | in<br>#15<br>#14<br>#13<br>7/32<br>#12 | .2055<br>.2130<br>.2188<br>.2188<br>.2210 | 69<br>80<br>67<br>67<br>71 | .0038<br>.0038<br>.0038<br>.0038<br>.0038 | .2093<br>.2168<br>.2226<br>.2226<br>.2248 | 63<br>72<br>59<br>67<br>62 |
|             |                  |             |   |                   |         |                                  |  |   |                            |   |   |                            |
| .3125       | 18               | URC         | .2520                                     | 83.8              | .2630   | 68.6                             | in<br>F<br>G<br>#12                    | .2570<br>.2610<br>.2610                   | 77<br>71<br>85             | .0038<br>.0041<br>.0038                   | .2608<br>.2651<br>.2608                   | 72<br>66<br>80             |
|             |                  |             |   |                   |         |                                  |  |   |                            |   |   |                            |
| .3125       | 24               | URF         | .2670                                     | 84.1              | .2754   | 68.5                             | in<br>J<br>K<br>9/32                   | .2660<br>.2720<br>.2770<br>.2810<br>.2812 | 86<br>75<br>77<br>78<br>77 | .0041<br>.0041<br>.0042<br>.0042          | .2701<br>.2761<br>.2811<br>.2852<br>.2854 | 65<br>78<br>67<br>68<br>67 |
|             |                  |             |   |                   |         |                                  |  |   |                            |   |   |                            |
| .3125       | 32               | UREF        | .2790                                     | 82.5              | .2847   | 68.5                             | in<br>K<br>9/32                        | .2810<br>.2812                            | 78<br>77                   | .0042<br>.0042                            | .2852<br>.2854                            | 68<br>67<br>67             |

1/ 100% of thread = 0.75H (see 20.2.3).

TABLE II.A.2 - Tap drill sizes, Unified screw threads, class 3B - continued

| Thread size | Threads per inch | Designation | Class 3B minor diameter, Internal threads |                   |         | Tap drills and percent of thread |            |                   |                         |                    |                   |       |       |    |
|-------------|------------------|-------------|---|-------------------|---------|----------------------------------|------------|-------------------|-------------------------|--------------------|-------------------|-------|-------|----|
|             |                  |             | Minimum                                   | Percent of thread | Maximum | Percent of thread                | Drill size | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |       |       |    |
| In<br>.375  | 16               | UNC         | .3070                                     | 83.8              | .3182   | 70.0                             | In<br>5/16 | .3125             | .0044                   | .3169              | 77                | .0044 | .3169 | 72 |
|             | 20               | UN          | .3210                                     | 83.1              | .3297   | 69.7                             | O          | .3160             | .0044                   | .3204              | 73                | .0044 | .3204 | 67 |
|             | 24               | UNF         | .3300                                     | 83.1              | .3372   | 69.8                             | P          | .3230             | .0044                   | .3274              | 80                | .0044 | .3274 | 73 |
|             | 28               | UN          | .3360                                     | 84.1              | .3426   | 69.8                             | Q          | .3320             | .0044                   | .3364              | 79                | .0044 | .3364 | 71 |
|             | 32               | UNEF        | .3410                                     | 83.8              | .3469   | 69.2                             | R          | .3390             | .0044                   | .3434              | 78                | .0044 | .3434 | 68 |
| .4375       | 14               | UNC         | .3600                                     | 83.5              | .3717   | 70.9                             | T          | .3580             | .0046                   | .3626              | 86                | .0046 | .3626 | 81 |
|             | 16               | UN          | .3700                                     | 83.1              | .3800   | 70.8                             | 23/64      | .3594             | .0046                   | .3640              | 84                | .0046 | .3640 | 79 |
|             | 20               | UNF         | .3830                                     | 83.9              | .3916   | 70.7                             | 3/8        | .3750             | .0046                   | .3796              | 77                | .0046 | .3796 | 71 |
|             | 28               | UNEF        | .3990                                     | 83.0              | .4051   | 69.8                             | V          | .3770             | .0046                   | .3816              | 75                | .0046 | .3816 | 69 |
|             | 32               | UN          | .4040                                     | 82.5              | .4094   | 69.2                             | W          | .3860             | .0046                   | .3906              | 79                | .0046 | .3906 | 72 |
| .500        | 12               | UNC         | .4100                                     | 83.1              | .4223   | 71.8                             | 25/64      | .4040             | .0046                   | .4086              | 72                | .0046 | .4086 | 62 |
|             | 13               | UNC         | .4170                                     | 83.1              | .4284   | 71.7                             | Y          | .4040             | .0046                   | .4086              | 71                | .0046 | .4086 | 71 |
|             | 16               | UN          | .4320                                     | 83.8              | .4419   | 71.6                             | Z          | .4062             | .0046                   | .4108              | 77                | .0046 | .4108 | 66 |
|             | 20               | UNF         | .4460                                     | 83.1              | .4537   | 71.3                             | 27/64      | .4130             | .0047                   | .4177              | 80                | .0047 | .4177 | 76 |
|             | 28               | UNEF        | .4610                                     | 84.1              | .4676   | 69.8                             | 31/64      | .4219             | .0047                   | .4266              | 72                | .0047 | .4266 | 68 |
| .5625       | 12               | UNC         | .4720                                     | 83.6              | .4843   | 72.2                             | 7/16       | .4375             | .0047                   | .4422              | 77                | .0047 | .4422 | 71 |
|             | 16               | UN          | .4950                                     | 83.1              | .5040   | 72.1                             | 29/64      | .4451             | .0047                   | .4497              | 78                | .0047 | .4497 | 73 |
|             | 18               | UNF         | .5020                                     | 83.8              | .5106   | 71.9                             | 11.8 mm    | .4546             | .0047                   | .4593              | 76                | .0047 | .4593 | 65 |
|             | 20               | UN          | .5080                                     | 83.9              | .5162   | 71.3                             | 15/32      | .4688             | .0048                   | .4736              | 77                | .0048 | .4736 | 65 |
|             | 24               | UNEF        | .5170                                     | 84.1              | .5244   | 70.4                             | 15/32      | .4688             | .0048                   | .4736              | 87                | .0048 | .4736 | 82 |
| .625        | 11               | UNC         | .5270                                     | 83.0              | .5391   | 72.7                             | 1/2        | .5000             | .0048                   | .5048              | 72                | .0048 | .5048 | 68 |
|             | 12               | UN          | .5350                                     | 83.1              | .5463   | 72.7                             | 1/2        | .5000             | .0048                   | .5048              | 77                | .0048 | .5048 | 71 |
|             | 16               | UN          | .5570                                     | 83.8              | .5662   | 72.4                             | 9/16       | .5062             | .0048                   | .5110              | 87                | .0048 | .5110 | 80 |
|             | 18               | UNF         | .5650                                     | 83.1              | .5730   | 72.1                             | 33/64      | .5156             | .0048                   | .5204              | 78                | .0048 | .5204 | 71 |
|             | 20               | UN          | .5710                                     | 83.1              | .5787   | 71.3                             | 33/64      | .5156             | .0048                   | .5204              | 72                | .0048 | .5204 | 65 |
| .625        | 24               | UNEF        | .5800                                     | 83.1              | .5869   | 70.4                             | 0.5203     | .5203             | .0048                   | .5251              | 78                | .0048 | .5251 | 78 |
|             | 28               | UN          | .5860                                     | 84.1              | .5926   | 69.8                             | 0.5263     | .5263             | .0049                   | .5312              | 78                | .0049 | .5312 | 67 |
|             | 32               | UN          | .5910                                     | 83.8              | .5969   | 69.2                             | 17/32      | .5312             | .0049                   | .5361              | 77                | .0049 | .5361 | 65 |
|             | 11               | UNC         | .5270                                     | 83.0              | .5391   | 72.7                             | 17/32      | .5312             | .0049                   | .5361              | 79                | .0049 | .5361 | 75 |
|             | 12               | UN          | .5350                                     | 83.1              | .5463   | 72.7                             | 35/64      | .5469             | .0049                   | .5518              | 72                | .0049 | .5518 | 68 |
| .625        | 16               | UN          | .5570                                     | 83.8              | .5662   | 72.4                             | 9/16       | .5625             | .0049                   | .5674              | 77                | .0049 | .5674 | 71 |
|             | 18               | UNF         | .5650                                     | 83.1              | .5730   | 72.1                             | 0.5687     | .5687             | .0049                   | .5736              | 87                | .0049 | .5736 | 80 |
|             | 20               | UN          | .5710                                     | 83.1              | .5787   | 71.3                             | 37/64      | .5781             | .0049                   | .5830              | 78                | .0049 | .5830 | 71 |
|             | 24               | UNEF        | .5800                                     | 83.1              | .5869   | 70.4                             | 37/64      | .5781             | .0049                   | .5830              | 72                | .0049 | .5830 | 65 |
|             | 28               | UN          | .5860                                     | 84.1              | .5926   | 69.8                             | 0.5828     | .5828             | .0049                   | .5877              | 87                | .0049 | .5877 | 78 |
| .625        | 32               | UN          | .5910                                     | 83.8              | .5969   | 69.2                             | 19/32      | .5938             | .0049                   | .5987              | 77                | .0049 | .5987 | 80 |

1/1008 of thread = 0.75H (see 20.2.3).

TABLE II.A.2 - Tap drill sizes, Unified screw threads, class 3B - continued

| Thread size | Threads per inch | Designation | Class 3B minor diameter, Internal threads |                   |         |                   | Tap drill and percent of thread |        |                   |                         |                    |                   |
|-------------|------------------|-------------|---|-------------------|---------|-------------------|---------------------------------|--------|-------------------|-------------------------|--------------------|-------------------|
|             |                  |             | Minimum                                   | Percent of thread | Maximum | Percent of thread | Drill size                      |        | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |
| .6875       | 12               | UN          | .5970                                     | 83.6              | .6085   | 73.0              | 19/32                           | .5938  | .0049             | .5987                   | 87                 | .82               |
| .6875       | 16               | UN          | .6200                                     | 83.1              | .6284   | 72.8              | 5/8                             | .6250  | .0050             | .6300                   | 77                 | .71               |
| .6875       | 20               | UN          | .6330                                     | 83.9              | .6412   | 71.3              | 41/64                           | .6406  | .0050             | .6456                   | 82                 | .65               |
| .6875       | 24               | UNEF        | .6420                                     | 84.1              | .6494   | 70.4              | 41/64                           | .6406  | .0050             | .6456                   | 77                 | .77               |
| .6875       | 28               | UN          | .6490                                     | 83.0              | .6551   | 69.8              | 16.5 mm                         | .6496  | .0050             | .6546                   | 82                 | .71               |
| .6875       | 32               | UN          | .6540                                     | 82.5              | .6594   | 69.2              | 21/32                           | .6582  | .0050             | .6612                   | 77                 | .65               |
| .750        | 10               | UNC         | .6420                                     | 83.1              | .6545   | 73.5              | 41/64                           | .6406  | .0050             | .6456                   | 84                 | .80               |
| .750        | 12               | UN          | .6600                                     | 83.1              | .6707   | 73.3              | 21/32                           | .6562  | .0050             | .6612                   | 87                 | .82               |
| .750        | 16               | UNF         | .6820                                     | 83.8              | .6908   | 72.9              | 11/16                           | .6875  | .0050             | .6925                   | 77                 | .71               |
| .750        | 20               | UNEF        | .6960                                     | 83.1              | .7037   | 71.3              | 45/64                           | .7031  | .0051             | .7082                   | 72                 | .64               |
| .750        | 28               | UN          | .7110                                     | 84.1              | .7176   | 69.8              | 18 mm                           | .7087  | .0051             | .7138                   | 89                 | .78               |
| .750        | 32               | UN          | .7160                                     | 83.8              | .7219   | 69.2              | 23/32                           | .7188  | .0051             | .7239                   | 77                 | .64               |
| .8125       | 12               | UN          | .7220                                     | 83.6              | .7329   | 73.5              | 18.5 mm                         | .7283  | .0051             | .7334                   | 78                 | .73               |
| .8125       | 16               | UN          | .7450                                     | 83.1              | .7533   | 72.9              | 3/4                             | .7500  | .0052             | .7552                   | 77                 | .71               |
| .8125       | 20               | UNEF        | .7580                                     | 83.9              | .7662   | 71.3              | 49/64                           | .7656  | .0052             | .7700                   | 72                 | .64               |
| .8125       | 28               | UN          | .7740                                     | 83.0              | .7801   | 69.8              | 19.75 mm                        | .7776  | .0052             | .7828                   | 75                 | .64               |
| .8125       | 32               | UN          | .7790                                     | 82.5              | .7844   | 69.2              | 25/32                           | .7812  | .0052             | .7864                   | 77                 | .64               |
| .875        | 9                | UNC         | .7550                                     | 83.1              | .7681   | 74.1              | 49/64                           | .7656  | .0052             | .7708                   | 76                 | .72               |
| .875        | 12               | UN          | .7850                                     | 83.1              | .7952   | 73.7              | 25/32                           | .7812  | .0052             | .7864                   | 82                 | .82               |
| .875        | 14               | UNF         | .7980                                     | 83.0              | .8068   | 73.5              | 51/64                           | .7969  | .0052             | .8021                   | 79                 | .79               |
| .875        | 16               | UN          | .8070                                     | 83.8              | .8158   | 72.9              | 0.8024                          | .8024  | .0052             | .8076                   | 73                 | .70               |
| .875        | 20               | UNEF        | .8210                                     | 83.1              | .8287   | 71.3              | 13/16                           | .8125  | .0053             | .8178                   | 70                 | .70               |
| .875        | 28               | UN          | .8360                                     | 84.1              | .8426   | 69.8              | 53/64                           | .8281  | .0054             | .8335                   | 64                 | .64               |
| .875        | 32               | UN          | .8410                                     | 83.8              | .8469   | 69.2              | 21.25 mm                        | .8366  | .0054             | .8420                   | 71                 | .71               |
| .9375       | 12               | UN          | .8470                                     | 83.6              | .8575   | 73.9              | 27/32                           | .8438  | .0055             | .8493                   | 77                 | .63               |
| .9375       | 16               | UN          | .8700                                     | 83.1              | .8783   | 72.9              | 7/8                             | .8638  | .0055             | .8693                   | 81                 | .81               |
| .9375       | 20               | UNEF        | .8830                                     | 83.9              | .8912   | 71.3              | 57/64                           | .8906  | .0057             | .8965                   | 70                 | .70               |
| .9375       | 28               | UN          | .8990                                     | 83.0              | .9051   | 69.8              | 22.75 mm                        | .8957  | .0059             | .9017                   | 63                 | .63               |
| .9375       | 32               | UN          | .9040                                     | 82.5              | .9094   | 69.2              | 29/32                           | .9062  | .0060             | .9122                   | 77                 | .62               |
| 1.000       | 8                | UNC         | .8650                                     | 83.1              | .8797   | 74.1              | 55/64                           | .8594  | .0059             | .8653                   | 83                 | .83               |
| 1.000       | 12               | UNF         | .9100                                     | 83.1              | .9198   | 74.1              | 7/8                             | .9050  | .0059             | .9109                   | 73                 | .73               |
| 1.000       | 14               | UNF         | .9230                                     | 83.0              | .9315   | 73.8              | 29/32                           | .9062  | .0060             | .9122                   | 81                 | .81               |
| 1.000       | 16               | UN          | .9320                                     | 83.8              | .9408   | 72.9              | 59/64                           | .9219  | .0060             | .9279                   | 78                 | .78               |
| 1.000       | 20               | UNEF        | .9460                                     | 83.1              | .9537   | 71.3              | 0.9274                          | .9274  | .0061             | .9335                   | 72                 | .72               |
| 1.000       | 28               | UN          | .9610                                     | 84.1              | .9676   | 69.8              | 15/16                           | .9375  | .0062             | .9437                   | 69                 | .69               |
| 1.000       | 32               | UN          | .9660                                     | 83.8              | .9719   | 69.2              | 61/64                           | .9311  | .0063             | .9394                   | 63                 | .63               |
| 1.0625      | 8                | UN          | .9270                                     | 83.4              | .9422   | 74.1              | 24.5 mm                         | .9688  | .0064             | .9709                   | 63                 | .63               |
| 1.0625      | 12               | UN          | .9720                                     | 83.6              | .9823   | 74.1              | 59/64                           | .9219  | .0060             | .9279                   | 83                 | .83               |
| 1.0625      | 16               | UN          | .9950                                     | 83.1              | 1.0033  | 72.9              | 0.9274                          | .9374  | .0061             | .9335                   | 79                 | .79               |
|             |                  |             |   |                   |         |                   | 15/16                           | .9175  | .0062             | .9437                   | 73                 | .73               |
|             |                  |             |   |                   |         |                   | 31/32                           | .9688  | .0065             | .9753                   | 81                 | .81               |
|             |                  |             |   |                   |         |                   | 1                               | 1.0000 | .0069             | 1.0069                  | 68                 | .68               |

1/100 of thread = 0.75H (see 20.2.3).

TABLE II.A.2 - Tap drill sizes, Unified screw threads, class 3B - continued

| Thread size | Threads per inch | Designation | Class 3B minor diameter, internal threads |                   |         | Tap drills and percent of thread |                  |                   |                         |                    |                   |
|-------------|------------------|-------------|---|-------------------|---------|----------------------------------|------------------|-------------------|-------------------------|--------------------|-------------------|
|             |                  |             | Minimum                                   | Percent of thread | Maximum | Percent of thread                | Drill size       | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |
| 1.0625      | 18               | UNEF        | 1.0020                                    | 83.8              | 1.0105  | 72.1                             | 1.0000           | 87                | .0069                   | 1.0069             | 77                |
|             | 20               | UN          | 1.0080                                    | 83.9              | 1.0162  | 71.3                             | 1.0156           | 72                | .0070                   | 1.0226             | 61                |
|             | 28               | UN          | 1.0240                                    | 83.0              | 1.0301  | 69.8                             | 1.0312           | 67                | .0071                   | 1.0383             | 52                |
| 1.125       | 7                | UNC         | .9700                                     | 83.5              | .9875   | 74.1                             | { 31/32<br>63/64 | 84                | .0062                   | .9750              | 81                |
|             | 8                | UN          | .9900                                     | 83.1              | 1.0047  | 74.1                             | 1.0000           | 76                | .0067                   | .9911              | 72                |
|             | 12               | UNF         | 1.0350                                    | 83.1              | 1.0448  | 74.1                             | 1.0312           | 77                | .0069                   | 1.0069             | 73                |
| 1.125       | 16               | UN          | 1.0570                                    | 83.8              | 1.0658  | 72.9                             | 1.0625           | 87                | .0071                   | 1.0383             | 80                |
|             | 18               | UNEF        | 1.0650                                    | 83.1              | 1.0730  | 72.1                             | 1.0625           | 77                | .0074                   | 1.0699             | 68                |
|             | 20               | UN          | 1.0710                                    | 83.1              | 1.0787  | 71.3                             | 1.0781           | 72                |                         |                    |                   |
| 1.1875      | 8                | UN          | 1.0520                                    | 83.4              | 1.0672  | 74.1                             | 1.0625           | 77                |                         |                    |                   |
|             | 12               | UN          | 1.0970                                    | 83.6              | 1.1073  | 74.1                             | 1.0938           | 87                |                         |                    |                   |
|             | 16               | UN          | 1.1200                                    | 83.1              | 1.1283  | 72.9                             | 1.1250           | 77                |                         |                    |                   |
| 1.250       | 18               | UNEF        | 1.1330                                    | 83.8              | 1.1355  | 72.1                             | 1.1250           | 87                |                         |                    |                   |
|             | 20               | UN          | 1.1330                                    | 83.9              | 1.1412  | 71.3                             | 1.1406           | 72                |                         |                    |                   |
|             | 28               | UN          | 1.1490                                    | 83.0              | 1.1551  | 69.8                             | 1.1516           | 77                |                         |                    |                   |
| 1.3125      | 7                | UNC         | 1.0950                                    | 83.5              | 1.1125  | 74.1                             | 1.0938           | 84                |                         |                    |                   |
|             | 8                | UN          | 1.1150                                    | 83.1              | 1.1297  | 74.1                             | 1.1250           | 77                |                         |                    |                   |
|             | 12               | UNF         | 1.1600                                    | 83.1              | 1.1698  | 74.1                             | 1.1562           | 87                |                         |                    |                   |
| 1.375       | 16               | UN          | 1.1820                                    | 83.8              | 1.1908  | 72.9                             | 1.1875           | 77                |                         |                    |                   |
|             | 18               | UNEF        | 1.1900                                    | 83.1              | 1.1980  | 72.1                             | 1.1875           | 87                |                         |                    |                   |
|             | 20               | UN          | 1.1960                                    | 83.1              | 1.2037  | 71.3                             | 1.2031           | 72                |                         |                    |                   |
| 1.375       | 28               | UN          | 1.2110                                    | 84.1              | 1.2176  | 69.8                             | 1.2106           | 85                |                         |                    |                   |
|             | 8                | UN          | 1.1770                                    | 83.4              | 1.1922  | 74.1                             | 1.1719           | 87                |                         |                    |                   |
|             | 12               | UN          | 1.2220                                    | 83.6              | 1.2323  | 74.1                             | 1.1875           | 77                |                         |                    |                   |
| 1.375       | 16               | UN          | 1.2450                                    | 83.1              | 1.2533  | 72.9                             | 1.2500           | 77                |                         |                    |                   |
|             | 18               | UNEF        | 1.2520                                    | 83.8              | 1.2605  | 72.1                             | 1.2500           | 87                |                         |                    |                   |
|             | 20               | UN          | 1.2580                                    | 83.9              | 1.2662  | 71.3                             | 1.2656           | 72                |                         |                    |                   |
| 1.375       | 28               | UN          | 1.2740                                    | 83.0              | 1.2801  | 69.8                             | 1.2795           | 71                |                         |                    |                   |
|             | 6                | UNC         | 1.1950                                    | 83.1              | 1.2146  | 74.1                             | 1.1875           | 87                |                         |                    |                   |
|             | 8                | UN          | 1.2400                                    | 83.1              | 1.2547  | 74.1                             | 1.2031           | 79                |                         |                    |                   |
| 1.375       | 12               | UNF         | 1.2850                                    | 83.1              | 1.2948  | 74.1                             | 1.2812           | 87                |                         |                    |                   |
|             | 16               | UN          | 1.3070                                    | 83.8              | 1.3158  | 72.9                             | 1.3125           | 77                |                         |                    |                   |
|             | 18               | UNEF        | 1.3150                                    | 83.1              | 1.3230  | 72.1                             | 1.3125           | 87                |                         |                    |                   |
| 1.375       | 20               | UN          | 1.3210                                    | 83.1              | 1.3281  | 71.3                             | 1.3281           | 72                |                         |                    |                   |
|             | 28               | UN          | 1.3360                                    | 84.1              | 1.3426  | 69.8                             | 1.3386           | 78                |                         |                    |                   |
|             | 34 mm            |             |   |                   |         |                                  |                  |                   |                         |                    |                   |

1/ 100% of thread = 0.75H (see 20.2.3).

TABLE II.A.2 - Tap drill sizes, Unified screw threads, class 3B - continued

| Thread size | Threads per inch | Designation | Class 3B minor diameter, internal threads |                   |              | Tap drills and percent of thread |              |                   |                         |                    |
|-------------|------------------|-------------|---|-------------------|--------------|----------------------------------|--------------|-------------------|-------------------------|--------------------|
|             |                  |             | Minimum                                   | Percent of thread | Maximum      | Percent of thread                | Drill size   | Percent of thread | Probable oversize, mean | Probable hole size |
| 1.4375      | 6                | UN          | in<br>1.2570                              | 83.4              | in<br>1.2771 | 74.1                             | in<br>1.2656 | 79                | in                      |                    |
| 1.4375      | 8                | UN          | 1.3020                                    | 83.4              | 1.3172       | 74.1                             | 1.2969       | 87                |                         |                    |
| 1.4375      | 12               | UN          | 1.3470                                    | 83.6              | 1.3573       | 74.1                             | 1.3438       | 87                |                         |                    |
| 1.4375      | 16               | UN          | 1.3700                                    | 83.1              | 1.3783       | 72.9                             | 1.3750       | 77                |                         |                    |
| 1.4375      | 18               | UNEF        | 1.3770                                    | 83.8              | 1.3855       | 72.1                             | 1.3750       | 87                |                         |                    |
| 1.4375      | 20               | UN          | 1.3830                                    | 83.9              | 1.3912       | 71.3                             | 1.3906       | 72                |                         |                    |
| 1.4375      | 28               | UN          | 1.3990                                    | 83.0              | 1.4051       | 69.8                             | 1.3976       | 86                |                         |                    |
| 1.500       | 6                | UNC         | 1.3200                                    | 83.1              | 1.3396       | 74.1                             | 1.3125       | 87                |                         |                    |
| 1.500       | 8                | UN          | 1.3650                                    | 83.1              | 1.3797       | 74.1                             | 1.3281       | 79                |                         |                    |
| 1.500       | 12               | UNF         | 1.4100                                    | 83.1              | 1.4198       | 74.1                             | 1.3594       | 87                |                         |                    |
| 1.500       | 16               | UN          | 1.4320                                    | 83.8              | 1.4408       | 72.9                             | 1.3750       | 77                |                         |                    |
| 1.500       | 18               | UNEF        | 1.4400                                    | 83.1              | 1.4480       | 72.1                             | 1.4062       | 87                |                         |                    |
| 1.500       | 20               | UN          | 1.4460                                    | 83.1              | 1.4537       | 71.3                             | 1.4375       | 87                |                         |                    |
| 1.500       | 28               | UN          | 1.4610                                    | 84.1              | 1.4676       | 69.8                             | 1.4531       | 72                |                         |                    |
| 1.5625      | 6                | UN          | 1.3820                                    | 83.4              | 1.4021       | 74.1                             | 1.3906       | 79                |                         |                    |
| 1.5625      | 8                | UN          | 1.4270                                    | 83.4              | 1.4422       | 74.1                             | 1.4219       | 87                |                         |                    |
| 1.5625      | 12               | UN          | 1.4720                                    | 83.6              | 1.4823       | 74.1                             | 1.4375       | 77                |                         |                    |
| 1.5625      | 16               | UN          | 1.4950                                    | 83.1              | 1.5033       | 72.9                             | 1.4668       | 87                |                         |                    |
| 1.5625      | 18               | UNEF        | 1.5020                                    | 83.8              | 1.5105       | 72.1                             | 1.5000       | 77                |                         |                    |
| 1.5625      | 20               | UN          | 1.5080                                    | 83.9              | 1.5162       | 71.3                             | 1.5000       | 87                |                         |                    |
| 1.625       | 6                | UN          | 1.4450                                    | 83.1              | 1.4646       | 74.1                             | 1.4531       | 79                |                         |                    |
| 1.625       | 8                | UN          | 1.4900                                    | 83.1              | 1.5047       | 74.1                             | 1.4844       | 87                |                         |                    |
| 1.625       | 12               | UN          | 1.5350                                    | 83.1              | 1.5448       | 74.1                             | 1.5000       | 77                |                         |                    |
| 1.625       | 16               | UN          | 1.5570                                    | 83.8              | 1.5658       | 72.9                             | 1.5312       | 87                |                         |                    |
| 1.625       | 18               | UNEF        | 1.5650                                    | 83.1              | 1.5730       | 72.1                             | 1.5625       | 77                |                         |                    |
| 1.625       | 20               | UN          | 1.5710                                    | 83.1              | 1.5787       | 71.3                             | 1.5625       | 87                |                         |                    |
| 1.6875      | 6                | UN          | 1.5070                                    | 83.4              | 1.5271       | 74.1                             | 1.5000       | 87                |                         |                    |
| 1.6875      | 8                | UN          | 1.5520                                    | 83.4              | 1.5672       | 74.1                             | 1.5156       | 79                |                         |                    |
| 1.6875      | 12               | UN          | 1.5970                                    | 83.6              | 1.6073       | 74.1                             | 1.5625       | 77                |                         |                    |
| 1.6875      | 16               | UN          | 1.6200                                    | 83.1              | 1.6283       | 72.9                             | 1.5938       | 87                |                         |                    |
| 1.6875      | 18               | UNEF        | 1.6270                                    | 83.8              | 1.6355       | 72.1                             | 1.6250       | 77                |                         |                    |
| 1.6875      | 20               | UN          | 1.6330                                    | 83.9              | 1.6412       | 71.3                             | 1.6250       | 87                |                         |                    |
| 1.750       | 5                | UNC         | 1.5340                                    | 83.1              | 1.5575       | 74.1                             | 1.5312       | 84                |                         |                    |
| 1.750       | 6                | UN          | 1.5700                                    | 83.1              | 1.5896       | 74.1                             | 1.5469       | 78                |                         |                    |

1/ 100% of thread = 0.75H (see 20.2.3).



TABLE II.A.2 - Tap drill sizes, Unified screw threads, class 3B - continued

| Thread size | Threads per inch | Designation | Class 3B minor diameter, internal threads |                   |         | Tap drills and percent of thread |            |                   |                         |                    |                   |    |  |
|-------------|------------------|-------------|---|-------------------|---------|----------------------------------|------------|-------------------|-------------------------|--------------------|-------------------|----|--|
|             |                  |             | Minimum                                   | Percent of thread | Maximum | Percent of thread                | Drill size | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |    |  |
| 1.750       | 8                | UN          | 1.6150                                    | 83.1              | 1.6297  | 74.1                             | 1.6094     | 87                | 1.6094                  | 87                 | in                | in |  |
| 1.750       | 12               | UN          | 1.6600                                    | 83.1              | 1.6698  | 74.1                             | 1.6250     | 77                | 1.6250                  | 77                 |                   |    |  |
| 1.750       | 16               | UN          | 1.6820                                    | 83.8              | 1.6908  | 72.9                             | 1.6562     | 87                | 1.6562                  | 87                 |                   |    |  |
| 1.750       | 20               | UN          | 1.6960                                    | 83.1              | 1.7037  | 71.3                             | 1.6875     | 77                | 1.6875                  | 77                 |                   |    |  |
| 1.8125      | 6                | UN          | 1.6320                                    | 83.4              | 1.6521  | 74.1                             | 1.6250     | 87                | 1.6250                  | 87                 |                   |    |  |
| 1.8125      | 8                | UN          | 1.6770                                    | 83.4              | 1.6922  | 74.1                             | 1.6406     | 79                | 1.6406                  | 79                 |                   |    |  |
| 1.8125      | 12               | UN          | 1.7220                                    | 83.6              | 1.7323  | 74.1                             | 1.6719     | 87                | 1.6719                  | 87                 |                   |    |  |
| 1.8125      | 16               | UN          | 1.7450                                    | 83.1              | 1.7533  | 72.9                             | 1.6875     | 77                | 1.6875                  | 77                 |                   |    |  |
| 1.8125      | 20               | UN          | 1.7580                                    | 83.9              | 1.7662  | 71.3                             | 1.7188     | 87                | 1.7188                  | 87                 |                   |    |  |
| 1.875       | 6                | UN          | 1.6950                                    | 83.1              | 1.7146  | 74.1                             | 1.7031     | 79                | 1.7031                  | 79                 |                   |    |  |
| 1.875       | 8                | UN          | 1.7400                                    | 83.1              | 1.7547  | 74.1                             | 1.7500     | 77                | 1.7500                  | 77                 |                   |    |  |
| 1.875       | 12               | UN          | 1.7850                                    | 83.1              | 1.7948  | 74.1                             | 1.7812     | 87                | 1.7812                  | 87                 |                   |    |  |
| 1.875       | 16               | UN          | 1.8070                                    | 83.8              | 1.8158  | 72.9                             | 1.8125     | 77                | 1.8125                  | 77                 |                   |    |  |
| 1.875       | 20               | UN          | 1.8210                                    | 83.1              | 1.8287  | 71.3                             | 1.8281     | 72                | 1.8281                  | 72                 |                   |    |  |
| 1.9375      | 6                | UN          | 1.7570                                    | 83.4              | 1.7771  | 74.1                             | 1.7656     | 79                | 1.7656                  | 79                 |                   |    |  |
| 1.9375      | 8                | UN          | 1.8020                                    | 83.4              | 1.8172  | 74.1                             | 1.7969     | 87                | 1.7969                  | 87                 |                   |    |  |
| 1.9375      | 12               | UN          | 1.8470                                    | 83.6              | 1.8573  | 74.1                             | 1.8125     | 77                | 1.8125                  | 77                 |                   |    |  |
| 1.9375      | 16               | UN          | 1.8700                                    | 83.1              | 1.8783  | 72.9                             | 1.8438     | 87                | 1.8438                  | 87                 |                   |    |  |
| 1.9375      | 20               | UN          | 1.8830                                    | 83.9              | 1.8912  | 71.3                             | 1.8750     | 77                | 1.8750                  | 77                 |                   |    |  |
| 2.000       | 4.5              | UNF         | 1.7590                                    | 83.5              | 1.7861  | 74.1                             | 1.7812     | 76                | 1.7812                  | 76                 |                   |    |  |
| 2.000       | 6                | UN          | 1.8200                                    | 83.1              | 1.8396  | 74.1                             | 1.8281     | 79                | 1.8281                  | 79                 |                   |    |  |
| 2.000       | 8                | UN          | 1.8650                                    | 83.1              | 1.8797  | 74.1                             | 1.8750     | 77                | 1.8750                  | 77                 |                   |    |  |
| 2.000       | 12               | UN          | 1.9100                                    | 83.1              | 1.9198  | 74.1                             | 1.9062     | 87                | 1.9062                  | 87                 |                   |    |  |
| 2.000       | 16               | UN          | 1.9320                                    | 83.8              | 1.9408  | 72.9                             | 1.9375     | 77                | 1.9375                  | 77                 |                   |    |  |
| 2.000       | 20               | UN          | 1.9460                                    | 83.1              | 1.9537  | 71.3                             | 1.9531     | 72                | 1.9531                  | 72                 |                   |    |  |
| 2.0625      | 16               | UNF         | 1.9950                                    | 83.1              | 2.0033  | 72.9                             | 2.0000     | 77                | 2.0000                  | 77                 |                   |    |  |
| 2.125       | 6                | UN          | 1.9450                                    | 83.1              | 1.9646  | 74.1                             | 1.9531     | 79                | 1.9531                  | 79                 |                   |    |  |
| 2.125       | 8                | UN          | 1.9900                                    | 83.1              | 2.0047  | 74.1                             | 2.0000     | 77                | 2.0000                  | 77                 |                   |    |  |
| 2.125       | 12               | UN          | 2.0350                                    | 83.1              | 2.0448  | 74.1                             | 2.0312     | 87                | 2.0312                  | 87                 |                   |    |  |
| 2.125       | 16               | UN          | 2.0570                                    | 83.8              | 2.0658  | 72.9                             | 2.0625     | 77                | 2.0625                  | 77                 |                   |    |  |
| 2.125       | 20               | UN          | 2.0710                                    | 83.1              | 2.0787  | 71.3                             | 2.0625     | 96                | 2.0625                  | 96                 |                   |    |  |
| 2.1875      | 16               | UNF         | 2.1200                                    | 83.1              | 2.1283  | 72.9                             | 2.1250     | 77                | 2.1250                  | 77                 |                   |    |  |
| 2.250       | 4.5              | UNC         | 2.0090                                    | 83.5              | 2.0361  | 74.1                             | 2.0000     | 87                | 2.0000                  | 87                 |                   |    |  |
| 2.250       | 6                | UN          | 2.0700                                    | 83.1              | 2.0896  | 74.1                             | 2.0625     | 87                | 2.0625                  | 87                 |                   |    |  |
| 2.250       | 8                | UN          | 2.1150                                    | 83.1              | 2.1297  | 74.1                             | 2.1250     | 77                | 2.1250                  | 77                 |                   |    |  |
| 2.250       | 12               | UN          | 2.1600                                    | 83.1              | 2.1698  | 74.1                             | 2.1562     | 87                | 2.1562                  | 87                 |                   |    |  |
| 2.250       | 16               | UN          | 2.1820                                    | 83.8              | 2.1908  | 72.9                             | 2.1875     | 77                | 2.1875                  | 77                 |                   |    |  |
| 2.250       | 20               | UN          | 2.1960                                    | 83.1              | 2.2037  | 71.3                             | 2.1875     | 96                | 2.1875                  | 96                 |                   |    |  |

1/100% of thread = 0.75H (see 20.2.3).

TABLE II.A.2 - Tap drill sizes, Unified screw threads, class 3B - continued

| Thread size  | Threads per inch | Designation | Class 3B minor diameter, internal threads |                   |              | Tap drills and percent of thread |              |                   |                         |                    |                   |              |              |    |
|--------------|------------------|-------------|---|-------------------|--------------|----------------------------------|--------------|-------------------|-------------------------|--------------------|-------------------|--------------|--------------|----|
|              |                  |             | Minimum                                   | Percent of thread | Maximum      | Percent of thread                | Drill size   | Percent of thread | Probable oversize, mean | Probable hole size | Percent of thread |              |              |    |
| In<br>2.3125 | 16               | UNS         | In<br>2.2450                              | 83.1              | In<br>2.2533 | 72.9                             | In<br>2.2500 | In<br>2 1/4       | In<br>2.2500            | In<br>2.2500       | 77                | In<br>2.2500 | In<br>2.2500 | 77 |
| 2.375        | 6                | UN          | 2.1950                                    | 83.1              | 2.2146       | 74.1                             | 2.1875       | 2 3/16            | 2.1875                  | 87                 | 2.1875            |              |              |    |
| 2.375        | 8                | UN          | 2.2400                                    | 83.1              | 2.2547       | 74.1                             | 2.2500       | 2 1/4             | 2.2500                  | 77                 | 2.2500            |              |              |    |
| 2.375        | 12               | UN          | 2.2850                                    | 83.1              | 2.2948       | 74.1                             | 2.2835       | 58 mm             | 2.2835                  | 85                 | 2.2835            |              |              |    |
| 2.375        | 16               | UN          | 2.3070                                    | 83.8              | 2.3158       | 72.9                             | 2.3125       | 2 5/16            | 2.3125                  | 77                 | 2.3125            |              |              |    |
| 2.375        | 20               | UN          | 2.3210                                    | 83.1              | 2.3287       | 71.3                             | 2.3125       | 2 5/16            | 2.3125                  | 96                 | 2.3125            |              |              |    |
| 2.4375       | 16               | UNS         | 2.3700                                    | 83.1              | 2.3783       | 72.9                             | 2.3750       | 2 3/8             | 2.3750                  | 77                 | 2.3750            |              |              |    |
| 2.500        | 4                | UNC         | 2.2290                                    | 83.4              | 2.2594       | 74.1                             | 2.2188       | 2 7/32            | 2.2188                  | 87                 | 2.2188            |              |              |    |
| 2.500        | 6                | UN          | 2.3200                                    | 83.1              | 2.3396       | 74.1                             | 2.3125       | 2 1/4             | 2.3125                  | 87                 | 2.3125            |              |              |    |
| 2.500        | 8                | UN          | 2.3650                                    | 83.1              | 2.3797       | 74.1                             | 2.3750       | 2 5/16            | 2.3750                  | 87                 | 2.3750            |              |              |    |
| 2.500        | 12               | UN          | 2.4100                                    | 83.1              | 2.4198       | 74.1                             | 2.4062       | 2 3/8             | 2.4062                  | 87                 | 2.4062            |              |              |    |
| 2.500        | 16               | UN          | 2.4320                                    | 83.8              | 2.4408       | 72.9                             | 2.4375       | 2 13/32           | 2.4375                  | 77                 | 2.4375            |              |              |    |
| 2.500        | 20               | UN          | 2.4460                                    | 83.1              | 2.4537       | 71.3                             | 2.4375       | 2 7/16            | 2.4375                  | 96                 | 2.4375            |              |              |    |
| 2.625        | 4                | UN          | 2.3540                                    | 83.4              | 2.3844       | 74.1                             | 2.3438       | 2 11/32           | 2.3438                  | 87                 | 2.3438            |              |              |    |
| 2.625        | 6                | UN          | 2.4450                                    | 83.1              | 2.4646       | 74.1                             | 2.4375       | 2 3/8             | 2.4375                  | 77                 | 2.4375            |              |              |    |
| 2.625        | 8                | UN          | 2.4900                                    | 83.1              | 2.5047       | 74.1                             | 2.5000       | 2 7/16            | 2.5000                  | 87                 | 2.5000            |              |              |    |
| 2.625        | 12               | UN          | 2.5350                                    | 83.1              | 2.5448       | 74.1                             | 2.5312       | 2 1/2             | 2.5312                  | 87                 | 2.5312            |              |              |    |
| 2.625        | 16               | UN          | 2.5570                                    | 83.8              | 2.5658       | 72.9                             | 2.5625       | 2 17/32           | 2.5625                  | 77                 | 2.5625            |              |              |    |
| 2.625        | 20               | UN          | 2.5710                                    | 83.1              | 2.5787       | 71.3                             | 2.5625       | 2 9/16            | 2.5625                  | 96                 | 2.5625            |              |              |    |
| 2.750        | 4                | UNC         | 2.4790                                    | 83.4              | 2.5094       | 74.1                             | 2.5000       | 2 1/2             | 2.5000                  | 77                 | 2.5000            |              |              |    |
| 2.750        | 6                | UN          | 2.5700                                    | 83.1              | 2.5896       | 74.1                             | 2.5625       | 2 1/2             | 2.5625                  | 87                 | 2.5625            |              |              |    |
| 2.750        | 8                | UN          | 2.6150                                    | 83.1              | 2.6297       | 74.1                             | 2.6250       | 2 5/8             | 2.6250                  | 77                 | 2.6250            |              |              |    |
| 2.750        | 12               | UN          | 2.6600                                    | 83.1              | 2.6698       | 74.1                             | 2.6562       | 2 21/32           | 2.6562                  | 87                 | 2.6562            |              |              |    |
| 2.750        | 16               | UN          | 2.6820                                    | 83.8              | 2.6908       | 72.9                             | 2.6875       | 2 11/16           | 2.6875                  | 77                 | 2.6875            |              |              |    |
| 2.750        | 20               | UN          | 2.6960                                    | 83.1              | 2.7037       | 71.3                             | 2.6875       | 2 11/16           | 2.6875                  | 96                 | 2.6875            |              |              |    |
| 2.875        | 4                | UN          | 2.6040                                    | 83.4              | 2.6344       | 74.1                             | 2.6250       | 2 5/8             | 2.6250                  | 77                 | 2.6250            |              |              |    |
| 2.875        | 6                | UN          | 2.6950                                    | 83.1              | 2.7146       | 74.1                             | 2.6875       | 2 11/16           | 2.6875                  | 87                 | 2.6875            |              |              |    |
| 2.875        | 8                | UN          | 2.7400                                    | 83.1              | 2.7547       | 74.1                             | 2.7500       | 2 3/4             | 2.7500                  | 77                 | 2.7500            |              |              |    |
| 2.875        | 12               | UN          | 2.7850                                    | 83.1              | 2.7948       | 74.1                             | 2.7812       | 2 25/32           | 2.7812                  | 87                 | 2.7812            |              |              |    |
| 2.875        | 16               | UN          | 2.8070                                    | 83.8              | 2.8158       | 72.9                             | 2.8125       | 2 25/32           | 2.8125                  | 77                 | 2.8125            |              |              |    |
| 2.875        | 20               | UN          | 2.8210                                    | 83.1              | 2.8287       | 71.3                             | 2.8125       | 2 13/16           | 2.8125                  | 96                 | 2.8125            |              |              |    |
| 3.000        | 4                | UNC         | 2.7290                                    | 83.4              | 2.7594       | 74.1                             | 2.7500       | 2 3/4             | 2.7500                  | 77                 | 2.7500            |              |              |    |
| 3.000        | 6                | UN          | 2.8200                                    | 83.1              | 2.8396       | 74.1                             | 2.8125       | 2 13/16           | 2.8125                  | 87                 | 2.8125            |              |              |    |
| 3.000        | 8                | UN          | 2.8650                                    | 83.1              | 2.8797       | 74.1                             | 2.8750       | 2 7/8             | 2.8750                  | 77                 | 2.8750            |              |              |    |
| 3.000        | 12               | UN          | 2.9100                                    | 83.1              | 2.9198       | 74.1                             | 2.9134       | 74 mm             | 2.9134                  | 80                 | 2.9134            |              |              |    |
| 3.000        | 16               | UN          | 2.9320                                    | 83.8              | 2.9408       | 72.9                             | 2.9375       | 2 15/16           | 2.9375                  | 77                 | 2.9375            |              |              |    |
| 3.000        | 20               | UN          | 2.9460                                    | 83.1              | 2.9537       | 71.3                             | 2.9375       | 2 15/16           | 2.9375                  | 96                 | 2.9375            |              |              |    |

1/ 100% of thread = 0.75H (see 20.2.3).

TABLE II.A.2 - Tap drill sizes, Unified screw threads, class 3B - continued

| Thread size | Threads per inch | Designation | Class 3B minor diameter, Internal threads |                   |         | Tap drill and percent of thread |            |                   |                         |                    |                   |    |    |  |  |
|-------------|------------------|-------------|---|-------------------|---------|---------------------------------|------------|-------------------|-------------------------|--------------------|-------------------|----|----|--|--|
|             |                  |             | Minimum                                   | Percent of Thread | Maximum | Percent of Thread               | Drill size | Percent of Thread | Probable oversize, mean | Probable hole size | Percent of Thread |    |    |  |  |
| in          |                  |             | in  |                   | in      |                                 |            | in                |                         |                    |                   |    |    |  |  |
| 3.250       | 4                | UNC         | 2.9790                                    | 83.4              | 3.0094  | 74.1                            |            | 3                 | 3.0000                  | 77                 |                   | in | in |  |  |
| 3.500       | 4                | UNC         | 3.2290                                    | 83.4              | 3.2594  | 74.1                            |            | 3 1/4             | 3.2500                  | 77                 |                   |    |    |  |  |
| 3.750       | 4                | UNC         | 3.4790                                    | 83.4              | 3.5094  | 74.1                            |            | 3 1/2             | 3.5000                  | 77                 |                   |    |    |  |  |

$\frac{1}{100}$  of thread = 0.75H (see 20.2.3).

## FED-STD-H28/2B

TABLE II.A.3 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, classes 1B and 2B (see 30.1) <sup>1/</sup>

| Nominal size in inches<br>and threads per inch | Series<br>designation | Minor diameter of internal threads |                                       |                       |                                       |
|--|-----------------------|------------------------------------|---------------------------------------|-----------------------|---------------------------------------|
|  |                       | Minimum                            | Percent <sup>2/</sup><br>of<br>Thread | Maximum <sup>3/</sup> | Percent <sup>2/</sup><br>of<br>Thread |
| 1  | 2                     | 3                                  | 4                                     | 5                     | 6                                     |
| .060-80 or No. 0-80                            | UNF                   | in<br>0.0465                       | 83.1                                  | in<br>0.0514          | 53.0                                  |
| .073-64 or No. 1-64                            | UNC                   | .0561                              | 83.3                                  | .0623                 | 52.7                                  |
| .073-72 or No. 1-72                            | UNF                   | .0580                              | 83.1                                  | .0635                 | 52.7                                  |
| .086-56 or No. 2-56                            | UNC                   | .0667                              | 83.2                                  | .0737                 | 53.0                                  |
| .086-64 or No. 2-64                            | UNF                   | .0691                              | 83.3                                  | .0753                 | 52.7                                  |
| .099-48 or No. 3-48                            | UNC                   | .0764                              | 83.5                                  | .0845                 | 53.6                                  |
| .099-56 or No. 3-56                            | UNF                   | .0797                              | 83.2                                  | .0865                 | 53.9                                  |
| .112-40 or No. 4-40                            | UNC                   | .0849                              | 83.4                                  | .0939                 | 55.7                                  |
| .112-48 or No. 4-48                            | UNF                   | .0894                              | 83.5                                  | .0968                 | 56.2                                  |
| .125-40 or No. 5-40                            | UNC                   | .0979                              | 83.4                                  | .1062                 | 57.9                                  |
| .125-44 or No. 5-44                            | UNF                   | .1004                              | 83.3                                  | .1079                 | 57.9                                  |
| .138-32 or No. 6-32                            | UNC                   | .104                               | 83.8                                  | .114                  | 59.1                                  |
| .138-40 or No. 6-40                            | UNF                   | .111                               | 83.1                                  | .119                  | 58.5                                  |
| .164-32 or No. 8-32                            | UNC                   | .130                               | 83.8                                  | .139                  | 61.6                                  |
| .164-36 or No. 8-36                            | UNF                   | .134                               | 83.1                                  | .142                  | 61.0                                  |
| .190-24 or No. 10-24                           | UNC                   | .145                               | 83.1                                  | .156                  | 62.8                                  |
| .190-32 or No. 10-32                           | UNF                   | .156                               | 83.8                                  | .164                  | 64.0                                  |
| .216-24 or No. 12-24                           | UNC                   | .171                               | 83.1                                  | .181                  | 64.7                                  |
| .216-28 or No. 12-28                           | UNF                   | .177                               | 84.1                                  | .186                  | 64.7                                  |
| .216-32 or No. 12-32                           | UNEF                  | .182                               | 83.8                                  | .190                  | 64.0                                  |
| .250-20 or 1/4-20                              | UNC                   | .196                               | 83.1                                  | .207                  | 66.2                                  |
| .250-28 or 1/4-28                              | UNF                   | .211                               | 84.1                                  | .220                  | 64.7                                  |
| .250-32 or 1/4-32                              | UNEF                  | .216                               | 83.8                                  | .224                  | 64.0                                  |
| .250-36 or 1/4-36                              | UNS                   | .220                               | 83.1                                  | .226                  | 66.5                                  |
| .3125-18 or 5/16-18                            | UNC                   | .252                               | 83.8                                  | .265                  | 65.8                                  |
| .3125-20 or 5/16-20                            | 20UN                  | .258                               | 83.9                                  | .270                  | 65.4                                  |
| .3125-24 or 5/16-24                            | UNF                   | .267                               | 84.1                                  | .277                  | 65.6                                  |
| .3125-28 or 5/16-28                            | 28UN                  | .274                               | 83.0                                  | .282                  | 65.7                                  |
| .3125-32 or 5/16-32                            | UNEF                  | .279                               | 82.5                                  | .286                  | 65.3                                  |
| .3125-36 or 5/16-36                            | UNS                   | .282                               | 84.5                                  | .289                  | 65.1                                  |
| .375-16 or 3/8-16                              | UNC                   | .307                               | 83.8                                  | .321                  | 66.5                                  |
| .375-20 or 3/8-20                              | 20UN                  | .321                               | 83.1                                  | .332                  | 66.2                                  |
| .375-24 or 3/8-24                              | UNF                   | .330                               | 83.1                                  | .340                  | 64.7                                  |
| .375-28 or 3/8-28                              | 28UN                  | .336                               | 84.1                                  | .345                  | 64.7                                  |
| .375-32 or 3/8-32                              | UNEF                  | .341                               | 83.8                                  | .349                  | 64.0                                  |
| .375-36 or 3/8-36                              | UNS                   | .345                               | 83.1                                  | .352                  | 63.7                                  |
| .4375-14 or 7/16-14                            | UNC                   | .360                               | 83.5                                  | .376                  | 66.3                                  |
| .4375-16 or 7/16-16                            | 16UN                  | .370                               | 83.1                                  | .384                  | 65.9                                  |
| .4375-20 or 7/16-20                            | UNF                   | .383                               | 83.9                                  | .395                  | 65.4                                  |
| .4375-28 or 7/16-28                            | UNEF                  | .399                               | 83.0                                  | .407                  | 65.7                                  |
| .4375-32 or 7/16-32                            | 32UN                  | .404                               | 82.5                                  | .411                  | 65.3                                  |
| .500-12 or 1/2-12                              | UNS                   | .410                               | 83.1                                  | .428                  | 66.5                                  |
| .500-13 or 1/2-13                              | UNC                   | .417                               | 83.1                                  | .434                  | 66.0                                  |
| .500-16 or 1/2-16                              | 16UN                  | .432                               | 83.8                                  | .446                  | 66.5                                  |
| .500-20 or 1/2-20                              | UNF                   | .446                               | 83.1                                  | .457                  | 66.2                                  |
| .500-28 or 1/2-28                              | UNEF                  | .461                               | 84.1                                  | .470                  | 64.7                                  |
| .500-32 or 1/2-32                              | 32UN                  | .466                               | 83.8                                  | .474                  | 64.0                                  |

See footnotes at end of table.

TABLE II.A.3 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, classes 1B and 2B (see 30.1) 1/ - continued

| Recommended hole size limits for different lengths of engagement |         |                        |         |                       |         | Nominal size in inches and threads per inch |
|--|---------|------------------------|---------|-----------------------|---------|---|
| To and including 0.33D   |         | Above 0.33D thru 0.67D |         | Above 0.67D thru 1.5D |         |   |
| Minimum  | Maximum | Minimum                | Maximum | Minimum               | Maximum |   |
| 7  | 8       | 9                      | 10      | 11                    | 12      | 1   |
| in   | in      | in                     | in      | in                    | in      |   |
| 0.0465   | 0.0500  | 0.0479                 | 0.0514  | 0.0479                | 0.0514  | .060-80 or No. 0-80                         |
| .0561  | .0599   | .0580                  | .0618   | .0585                 | .0623   | .073-64 or No. 1-64                         |
| .0580  | .0613   | .0596                  | .0629   | .0602                 | .0635   | .073-72 or No. 1-72                         |
| .0667  | .0705   | .0686                  | .0724   | .0699                 | .0737   | .086-56 or No. 2-56                         |
| .0691  | .0724   | .0707                  | .0740   | .0720                 | .0753   | .086-64 or No. 2-64                         |
| .0764  | .0804   | .0785                  | .0825   | .0805                 | .0845   | .099-48 or No. 3-48                         |
| .0797  | .0831   | .0814                  | .0848   | .0831                 | .0865   | .099-56 or No. 3-56                         |
| .0849  | .0849   | .0871                  | .0916   | .0894                 | .0939   | .112-40 or No. 4-40                         |
| .0894  | .0931   | .0912                  | .0949   | .0931                 | .0968   | .112-48 or No. 4-48                         |
| .0979  | .1020   | .1000                  | .1041   | .1021                 | .1062   | .125-40 or No. 5-40                         |
| .1004  | .1041   | .1023                  | .1060   | .1042                 | .1079   | .125-44 or No. 5-44                         |
| .104   | .109    | .106                   | .112    | .109                  | .114    | .138-32 or No. 6-32                         |
| .111   | .115    | .113                   | .117    | .115                  | .119    | .138-40 or No. 6-40                         |
| .130   | .135    | .132                   | .137    | .134                  | .139    | .164-32 or No. 8-32                         |
| .134   | .138    | .136                   | .140    | .138                  | .142    | .164-36 or No. 8-36                         |
| .145   | .150    | .147                   | .153    | .150                  | .156    | .190-24 or No. 10-24                        |
| .156   | .160    | .158                   | .162    | .160                  | .164    | .190-32 or No. 10-32                        |
| .171   | .176    | .173                   | .178    | .176                  | .181    | .216-24 or No. 12-24                        |
| .177   | .182    | .179                   | .184    | .181                  | .186    | .216-28 or No. 12-28                        |
| .182   | .186    | .184                   | .188    | .186                  | .190    | .216-32 or No. 12-32                        |
| .196   | .202    | .199                   | .204    | .202                  | .207    | .250-20 or 1/4-20                           |
| .211   | .216    | .213                   | .218    | .216                  | .220    | .250-28 or 1/4-28                           |
| .216   | .220    | .218                   | .222    | .220                  | .224    | .250-32 or 1/4-32                           |
| .220   | .223    | .221                   | .225    | .222                  | .226    | .250-36 or 1/4-36                           |
| .252   | .259    | .256                   | .262    | .259                  | .265    | .3125-18 or 5/16-18                         |
| .258   | .264    | .261                   | .267    | .264                  | .270    | .3125-20 or 5/16-20                         |
| .267   | .272    | .270                   | .275    | .272                  | .277    | .3125-24 or 5/16-24                         |
| .274   | .278    | .276                   | .280    | .278                  | .282    | .3125-28 or 5/16-28                         |
| .279   | .282    | .280                   | .284    | .282                  | .286    | .3125-32 or 5/16-32                         |
| .282   | .286    | .283                   | .287    | .285                  | .289    | .3125-36 or 5/16-36                         |
| .307   | .314    | .311                   | .318    | .314                  | .321    | .375-16 or 3/8-16                           |
| .321   | .327    | .324                   | .330    | .327                  | .332    | .375-20 or 3/8-20                           |
| .330   | .335    | .332                   | .337    | .335                  | .340    | .375-24 or 3/8-24                           |
| .336   | .340    | .338                   | .343    | .340                  | .345    | .375-28 or 3/8-28                           |
| .341   | .345    | .343                   | .347    | .345                  | .349    | .375-32 or 3/8-32                           |
| .345   | .348    | .346                   | .350    | .348                  | .352    | .375-36 or 3/8-36                           |
| .360   | .368    | .364                   | .372    | .368                  | .376    | .4375-14 or 7/16-14                         |
| .370   | .377    | .373                   | .380    | .377                  | .384    | .4375-16 or 7/16-16                         |
| .383   | .389    | .386                   | .392    | .389                  | .395    | .4375-20 or 7/16-20                         |
| .399   | .403    | .401                   | .405    | .403                  | .407    | .4375-28 or 7/16-28                         |
| .404   | .407    | .405                   | .409    | .407                  | .411    | .4375-32 or 7/16-32                         |
| .410   | .419    | .414                   | .423    | .419                  | .428    | .500-12 or 1/2-12                           |
| .417   | .425    | .421                   | .430    | .425                  | .434    | .500-13 or 1/2-13                           |
| .432   | .439    | .436                   | .443    | .439                  | .446    | .500-16 or 1/2-16                           |
| .446   | .452    | .449                   | .454    | .452                  | .457    | .500-20 or 1/2-20                           |
| .461   | .466    | .463                   | .468    | .466                  | .470    | .500-28 or 1/2-28                           |
| .466   | .470    | .468                   | .472    | .470                  | .474    | .500-32 or 1/2-32                           |

See footnotes at end of table.

## FED-STD-H28/2B

TABLE II.A.2 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, classes 1B and 2B (see 30.1) 1/ - continued

| Nominal size in inches<br>and threads per inch | Series<br>designation | Minor diameter of internal threads |                                       |                       |                                       |
|--|-----------------------|------------------------------------|---------------------------------------|-----------------------|---------------------------------------|
|  |                       | Minimum                            | Percent <sup>2/</sup><br>of<br>Thread | Maximum <sup>3/</sup> | Percent <sup>2/</sup><br>of<br>Thread |
| 1  | 2                     | 3                                  | 4                                     | 5                     | 6                                     |
|  |                       | in                                 |                                       | in                    |                                       |
| .5625-12 or 9/16-12                            | UNC                   | .472                               | 83.6                                  | .490                  | 67.0                                  |
| .5625-16 or 9/16-16                            | 16UN                  | .495                               | 83.1                                  | .509                  | 65.9                                  |
| .5625-18 or 9/16-18                            | UNF                   | .502                               | 83.8                                  | .515                  | 65.8                                  |
| .5625-20 or 9/16-20                            | 20UN                  | .508                               | 83.9                                  | .520                  | 65.4                                  |
| .5625-24 or 9/16-24                            | UNEF                  | .517                               | 84.1                                  | .527                  | 65.6                                  |
| .5625-28 or 9/16-28                            | 28UN                  | .524                               | 83.0                                  | .532                  | 65.7                                  |
| .5625-32 or 9/16-32                            | 32UN                  | .529                               | 82.5                                  | .536                  | 65.3                                  |
| .625-11 or 5/8-11                              | UNC                   | .527                               | 83.0                                  | .546                  | 66.9                                  |
| .625-12 or 5/8-12                              | 12UN                  | .535                               | 83.1                                  | .553                  | 66.5                                  |
| .625-16 or 5/8-16                              | 16UN                  | .557                               | 83.8                                  | .571                  | 66.5                                  |
| .625-18 or 5/8-18                              | UNF                   | .565                               | 83.1                                  | .578                  | 65.1                                  |
| .625-20 or 5/8-20                              | 20UN                  | .571                               | 83.1                                  | .582                  | 66.2                                  |
| .625-24 or 5/8-24                              | UNEF                  | .580                               | 83.1                                  | .590                  | 64.7                                  |
| .625-28 or 5/8-28                              | 28UN                  | .586                               | 84.1                                  | .595                  | 64.7                                  |
| .625-32 or 5/8-32                              | 32UN                  | .591                               | 83.8                                  | .599                  | 64.0                                  |
| .6875-12 or 11/16-12                           | 12UN                  | .597                               | 83.6                                  | .615                  | 67.0                                  |
| .6875-16 or 11/16-16                           | 16UN                  | .620                               | 83.1                                  | .634                  | 65.9                                  |
| .6875-18 or 11/16-18                           | UNS                   | .627                               | 83.8                                  | .640                  | 65.8                                  |
| .6875-20 or 11/16-20                           | 20UN                  | .633                               | 83.9                                  | .645                  | 65.4                                  |
| .6875-24 or 11/16-24                           | UNEF                  | .642                               | 84.1                                  | .652                  | 65.6                                  |
| .6875-28 or 11/16-28                           | 28UN                  | .649                               | 83.0                                  | .657                  | 65.7                                  |
| .6875-32 or 11/16-32                           | 32UN                  | .654                               | 82.5                                  | .661                  | 65.3                                  |
| .750-10 or 3/4-10                              | UNC                   | .642                               | 83.1                                  | .663                  | 67.0                                  |
| .750-12 or 3/4-12                              | 12UN                  | .660                               | 83.1                                  | .678                  | 66.5                                  |
| .750-16 or 3/4-16                              | UNF                   | .682                               | 83.8                                  | .696                  | 66.5                                  |
| .750-18 or 3/4-18                              | UNS                   | .690                               | 83.1                                  | .703                  | 65.1                                  |
| .750-20 or 3/4-20                              | UNEF                  | .696                               | 83.1                                  | .707                  | 66.2                                  |
| .750-28 or 3/4-28                              | 28UN                  | .711                               | 84.1                                  | .720                  | 64.7                                  |
| .750-32 or 3/4-32                              | 32UN                  | .716                               | 83.8                                  | .724                  | 64.0                                  |
| .8125-12 or 13/16-12                           | 12UN                  | .722                               | 83.6                                  | .740                  | 67.0                                  |
| .8125-16 or 13/16-16                           | 12UN                  | .745                               | 83.1                                  | .759                  | 65.9                                  |
| .8125-18 or 13/16-18                           | UNS                   | .752                               | 83.8                                  | .765                  | 65.8                                  |
| .8125-20 or 13/16-20                           | UNEF                  | .758                               | 83.9                                  | .770                  | 65.4                                  |
| .8125-28 or 13/16-28                           | 28UN                  | .774                               | 83.0                                  | .782                  | 65.7                                  |
| .8125-32 or 13/16-32                           | 32UN                  | .779                               | 82.5                                  | .786                  | 65.3                                  |
| .875-9 or 7/8-9                                | UNC                   | .755                               | 83.1                                  | .778                  | 67.2                                  |
| .875-12 or 7/8-12                              | 12UN                  | .785                               | 83.1                                  | .803                  | 66.5                                  |
| .875-14 or 7/8-14                              | UNF                   | .758                               | 83.0                                  | .814                  | 65.7                                  |
| .875-16 or 7/8-16                              | 16UN                  | .807                               | 83.8                                  | .821                  | 66.5                                  |
| .875-18 or 7/8-18                              | UNS                   | .815                               | 83.1                                  | .828                  | 65.1                                  |
| .875-20 or 7/8-20                              | UNEF                  | .821                               | 83.1                                  | .832                  | 66.2                                  |
| .875-28 or 7/8-28                              | 28UN                  | .836                               | 84.1                                  | .845                  | 64.7                                  |
| .875-32 or 7/8-32                              | 32UN                  | .841                               | 83.8                                  | .849                  | 64.0                                  |
| .9375-12 or 15/16-12                           | 12UN                  | .847                               | 83.6                                  | .865                  | 67.0                                  |
| .9375-16 or 15/16-16                           | 16UN                  | .870                               | 83.1                                  | .884                  | 65.9                                  |
| .9375-20 or 15/16-20                           | UNEF                  | .883                               | 83.9                                  | .895                  | 65.4                                  |
| .9375-28 or 15/16-28                           | 28UN                  | .899                               | 83.0                                  | .907                  | 65.7                                  |
| .9375-32 or 15/16-32                           | 32UN                  | .904                               | 82.5                                  | .911                  | 65.3                                  |

See footnotes at end of table.

TABLE II.A.3— Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, classes 1B and 2B (see 30.1) 1/ - continued

| Recommended hole size limits for different lengths of engagement |         |                        |         |                       |         | Nominal size in inches<br>and threads per inch |
|--|---------|------------------------|---------|-----------------------|---------|--|
| To and including 0.33D   |         | Above 0.33D thru 0.67D |         | Above 0.67D thru 1.5D |         |  |
| Minimum  | Maximum | Minimum                | Maximum | Minimum               | Maximum |  |
| 7  | 8       | 9                      | 10      | 11                    | 12      | 1  |
| in   | in      | in                     | in      | in                    | in      |  |
| .472   | .481    | .477                   | .486    | .481                  | .490    | .5625-12 or 9/16-12                            |
| .495   | .502    | .498                   | .505    | .502                  | .509    | .5625-16 or 9/16-16                            |
| .502   | .509    | .506                   | .512    | .509                  | .515    | .5625-18 or 9/16-18                            |
| .508   | .514    | .511                   | .517    | .514                  | .520    | .5625-20 or 9/16-20                            |
| .517   | .522    | .520                   | .525    | .522                  | .527    | .5625-24 or 9/16-24                            |
| .524   | .528    | .526                   | .530    | .528                  | .532    | .5625-28 or 9/16-28                            |
| .529   | .532    | .530                   | .534    | .532                  | .536    | .5625-32 or 9/16-32                            |
| .527   | .536    | .532                   | .541    | .536                  | .546    | .625-11 or 5/8-11                              |
| .535   | .544    | .539                   | .548    | .544                  | .553    | .625-12 or 5/8-12                              |
| .557   | .564    | .561                   | .568    | .564                  | .571    | .625-16 or 5/8-16                              |
| .565   | .571    | .568                   | .574    | .571                  | .578    | .625-18 or 5/8-18                              |
| .571   | .577    | .574                   | .580    | .577                  | .582    | .625-20 or 5/8-20                              |
| .580   | .585    | .582                   | .587    | .585                  | .590    | .625-24 or 5/8-24                              |
| .586   | .590    | .588                   | .593    | .590                  | .595    | .625-28 or 5/8-28                              |
| .591   | .595    | .593                   | .597    | .595                  | .599    | .625-32 or 5/8-32                              |
| .597   | .606    | .602                   | .611    | .606                  | .615    | .6875-12 or 11/16-12                           |
| .620   | .627    | .623                   | .630    | .627                  | .634    | .6875-16 or 11/16-16                           |
| .627   | .634    | .630                   | .637    | .634                  | .640    | .6875-18 or 11/16-18                           |
| .633   | .639    | .636                   | .642    | .639                  | .645    | .6875-20 or 11/16-20                           |
| .642   | .647    | .645                   | .650    | .647                  | .652    | .6875-24 or 11/16-24                           |
| .649   | .653    | .651                   | .655    | .653                  | .657    | .6875-28 or 11/16-28                           |
| .654   | .657    | .655                   | .659    | .657                  | .661    | .6875-32 or 11/16-32                           |
| .642   | .652    | .647                   | .658    | .652                  | .663    | .750-10 or 3/4-10                              |
| .660   | .669    | .664                   | .673    | .669                  | .678    | .750-12 or 3/4-12                              |
| .682   | .689    | .686                   | .693    | .689                  | .696    | .750-16 or 3/4-16                              |
| .690   | .696    | .693                   | .699    | .696                  | .703    | .750-18 or 3/4-18                              |
| .696   | .702    | .699                   | .704    | .702                  | .707    | .750-20 or 3/4-20                              |
| .711   | .716    | .713                   | .718    | .716                  | .720    | .750-28 or 3/4-28                              |
| .716   | .720    | .718                   | .722    | .720                  | .724    | .750-32 or 3/4-32                              |
| .722   | .731    | .727                   | .736    | .731                  | .740    | .8125-12 or 13/16-12                           |
| .745   | .752    | .748                   | .755    | .752                  | .759    | .8125-16 or 13/16-16                           |
| .752   | .759    | .756                   | .762    | .759                  | .765    | .8125-18 or 13/16-18                           |
| .758   | .764    | .761                   | .767    | .764                  | .770    | .8125-20 or 13/16-20                           |
| .774   | .778    | .776                   | .780    | .778                  | .782    | .8125-28 or 13/16-28                           |
| .779   | .782    | .780                   | .784    | .782                  | .786    | .8125-32 or 13/16-32                           |
| .755   | .766    | .760                   | .772    | .766                  | .778    | .875-9 or 7/8-9                                |
| .785   | .794    | .789                   | .798    | .794                  | .803    | .875-12 or 7/8-12                              |
| .798   | .806    | .802                   | .810    | .806                  | .814    | .875-14 or 7/8-14                              |
| .807   | .814    | .811                   | .818    | .814                  | .821    | .875-16 or 7/8-16                              |
| .815   | .821    | .818                   | .824    | .821                  | .828    | .875-18 or 7/8-18                              |
| .821   | .827    | .824                   | .830    | .827                  | .832    | .875-20 or 7/8-20                              |
| .836   | .840    | .838                   | .843    | .840                  | .845    | .875-28 or 7/8-28                              |
| .841   | .845    | .843                   | .847    | .845                  | .849    | .875-32 or 7/8-32                              |
| .847   | .856    | .852                   | .861    | .856                  | .865    | .9375-12 or 15/16-12                           |
| .870   | .877    | .873                   | .880    | .877                  | .884    | .9375-16 or 15/16-16                           |
| .883   | .889    | .886                   | .892    | .889                  | .895    | .9375-20 or 15/16-20                           |
| .899   | .903    | .901                   | .905    | .903                  | .907    | .9375-28 or 15/16-28                           |
| .904   | .907    | .905                   | .909    | .907                  | .911    | .9375-32 or 15/16-32                           |

See footnotes at end of table.

## FED-STD-H28/2B

TABLE II.A.3 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, classes 1B and 2B (see 30.1) 1/ - continued

| Nominal size in inches<br>and threads per inch | Series<br>designation | Minor diameter of internal threads |                                       |                       |                                       |
|--|-----------------------|------------------------------------|---------------------------------------|-----------------------|---------------------------------------|
|  |                       | Minimum                            | Percent <sup>2/</sup><br>of<br>Thread | Maximum <sup>3/</sup> | Percent <sup>2/</sup><br>of<br>Thread |
| 1  | 2                     | 3                                  | 4                                     | 5                     | 6                                     |
| 1.000-8  | UNC                   | .865                               | 83.1                                  | .890                  | 67.7                                  |
| 1.000-12                                       | UNF                   | .910                               | 83.1                                  | .928                  | 66.5                                  |
| 1.000-14                                       | UNS                   | .923                               | 83.0                                  | .938                  | 66.8                                  |
| 1.000-16                                       | 16UN                  | .932                               | 83.8                                  | .946                  | 66.5                                  |
| 1.000-18                                       | UNS                   | .940                               | 83.1                                  | .953                  | 65.1                                  |
| 1.000-20                                       | UNEF                  | .946                               | 83.1                                  | .957                  | 66.2                                  |
| 1.000-28                                       | 28UN                  | .961                               | 84.1                                  | .970                  | 64.7                                  |
| 1.000-32                                       | 32UN                  | .966                               | 83.8                                  | .974                  | 64.0                                  |
| 1.0625-8                                       | 8UN                   | .927                               | 83.4                                  | .952                  | 68.1                                  |
| 1.0625-12                                      | 12UN                  | .972                               | 83.6                                  | .990                  | 67.0                                  |
| 1.0625-14                                      | UNS                   | .985                               | 83.5                                  | 1.001                 | 66.3                                  |
| 1.0625-16                                      | 16UN                  | .995                               | 83.1                                  | 1.009                 | 65.9                                  |
| 1.0625-18                                      | UNEF                  | 1.002                              | 83.8                                  | 1.015                 | 65.8                                  |
| 1.0625-20                                      | 20UN                  | 1.008                              | 83.9                                  | 1.020                 | 65.4                                  |
| 1.0625-28                                      | 28UN                  | 1.024                              | 83.0                                  | 1.032                 | 65.7                                  |
| 1.125-7  | UNC                   | 0.970                              | 83.5                                  | 0.998                 | 68.4                                  |
| 1.125-8  | 8UN                   | .990                               | 83.1                                  | 1.015                 | 67.7                                  |
| 1.125-12                                       | UNF                   | 1.035                              | 83.1                                  | 1.053                 | 66.5                                  |
| 1.125-16                                       | 16UN                  | 1.057                              | 83.8                                  | 1.071                 | 66.5                                  |
| 1.125-18                                       | UNEF                  | 1.065                              | 83.1                                  | 1.078                 | 65.1                                  |
| 1.125-20                                       | 20UN                  | 1.071                              | 83.1                                  | 1.082                 | 66.2                                  |
| 1.125-28                                       | 28UN                  | 1.086                              | 84.1                                  | 1.095                 | 64.7                                  |
| 1.1875-8                                       | 8UN                   | 1.052                              | 83.4                                  | 1.077                 | 68.1                                  |
| 1.1875-12                                      | 12UN                  | 1.097                              | 83.6                                  | 1.115                 | 67.0                                  |
| 1.1875-16                                      | 16UN                  | 1.120                              | 83.1                                  | 1.134                 | 65.9                                  |
| 1.1875-18                                      | UNEF                  | 1.127                              | 83.8                                  | 1.140                 | 65.8                                  |
| 1.1875-20                                      | 20UN                  | 1.133                              | 83.9                                  | 1.145                 | 65.4                                  |
| 1.1875-28                                      | 28UN                  | 1.149                              | 83.0                                  | 1.157                 | 65.7                                  |
| 1.250-7  | UNC                   | 1.095                              | 83.5                                  | 1.123                 | 68.4                                  |
| 1.250-8  | 8UN                   | 1.115                              | 83.1                                  | 1.140                 | 67.7                                  |
| 1.250-12                                       | UNF                   | 1.160                              | 83.1                                  | 1.178                 | 66.5                                  |
| 1.250-16                                       | 16UN                  | 1.182                              | 83.8                                  | 1.196                 | 66.5                                  |
| 1.250-18                                       | UNEF                  | 1.190                              | 83.1                                  | 1.203                 | 65.1                                  |
| 1.250-20                                       | 20UN                  | 1.196                              | 83.1                                  | 1.207                 | 66.2                                  |
| 1.250-28                                       | 28UN                  | 1.211                              | 84.1                                  | 1.220                 | 64.7                                  |
| 1.3125-8                                       | 8UN                   | 1.177                              | 83.4                                  | 1.202                 | 68.1                                  |
| 1.3125-12                                      | 12UN                  | 1.222                              | 83.6                                  | 1.240                 | 67.0                                  |
| 1.3125-16                                      | 16UN                  | 1.245                              | 83.1                                  | 1.259                 | 65.9                                  |
| 1.3125-18                                      | UNEF                  | 1.252                              | 83.8                                  | 1.265                 | 65.8                                  |
| 1.3125-20                                      | 20UN                  | 1.258                              | 83.9                                  | 1.270                 | 65.4                                  |
| 1.3125-28                                      | 28UN                  | 1.274                              | 83.0                                  | 1.282                 | 65.7                                  |
| 1.375-6  | UNC                   | 1.195                              | 83.1                                  | 1.225                 | 69.3                                  |
| 1.375-8  | 8UN                   | 1.240                              | 83.1                                  | 1.265                 | 67.7                                  |
| 1.375-12                                       | UNF                   | 1.285                              | 83.1                                  | 1.303                 | 66.5                                  |
| 1.375-16                                       | 16UN                  | 1.307                              | 83.8                                  | 1.321                 | 66.5                                  |
| 1.375-18                                       | UNEF                  | 1.315                              | 83.1                                  | 1.328                 | 65.1                                  |
| 1.375-20                                       | 20UN                  | 1.321                              | 83.1                                  | 1.332                 | 66.2                                  |
| 1.375-28                                       | 28UN                  | 1.336                              | 84.1                                  | 1.345                 | 64.7                                  |
| 1.4375-6                                       | 6UN                   | 1.257                              | 83.4                                  | 1.288                 | 69.1                                  |
| 1.4375-8                                       | 8UN                   | 1.302                              | 83.4                                  | 1.327                 | 68.1                                  |
| 1.4375-12                                      | 12UN                  | 1.347                              | 83.6                                  | 1.365                 | 67.0                                  |
| 1.4375-16                                      | 16UN                  | 1.370                              | 83.1                                  | 1.384                 | 65.9                                  |
| 1.4375-18                                      | UNEF                  | 1.377                              | 83.8                                  | 1.390                 | 65.8                                  |
| 1.4375-20                                      | 20UN                  | 1.383                              | 83.9                                  | 1.395                 | 65.4                                  |
| 1.4375-28                                      | 28UN                  | 1.399                              | 83.0                                  | 1.407                 | 65.7                                  |
| 1.500-6  | UNC                   | 1.320                              | 83.1                                  | 1.350                 | 69.3                                  |
| 1.500-8  | 8UN                   | 1.365                              | 83.1                                  | 1.390                 | 67.7                                  |
| 1.500-12                                       | UNF                   | 1.410                              | 83.1                                  | 1.428                 | 66.5                                  |
| 1.500-16                                       | 16UN                  | 1.432                              | 83.8                                  | 1.446                 | 66.5                                  |
| 1.500-18                                       | UNEF                  | 1.440                              | 83.1                                  | 1.453                 | 65.1                                  |
| 1.500-20                                       | 20UN                  | 1.446                              | 83.1                                  | 1.457                 | 66.2                                  |
| 1.500-28                                       | 28UN                  | 1.461                              | 84.1                                  | 1.470                 | 64.7                                  |

See footnotes at end of table.



TABLE II.A.3 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, classes 1B and 2B (see 30.1) 1/ - continued

| Recommended hole size limits for different lengths of engagement |         |                        |         |                       |         | Nominal size in inches<br>and threads per inch |
|--|---------|------------------------|---------|-----------------------|---------|--|
| To and including 0.33D   |         | Above 0.33D thru 0.67D |         | Above 0.67D thru 1.5D |         |  |
| Minimum  | Maximum | Minimum                | Maximum | Minimum               | Maximum |  |
| 7  | 8       | 9                      | 10      | 11                    | 12      | 1  |
| .865   | .877    | .871                   | .884    | .877                  | .890    | 1.000-8  |
| .910   | .919    | .914                   | .923    | .919                  | .928    | 1.000-12                                       |
| .923   | .931    | .927                   | .934    | .931                  | .938    | 1.000-14                                       |
| .932   | .939    | .936                   | .943    | .939                  | .946    | 1.000-16                                       |
| .940   | .946    | .943                   | .949    | .946                  | .953    | 1.000-18                                       |
| .946   | .952    | .949                   | .954    | .952                  | .957    | 1.000-20                                       |
| .961   | .966    | .963                   | .968    | .966                  | .970    | 1.000-28                                       |
| .966   | .970    | .968                   | .972    | .970                  | .974    | 1.000-32                                       |
| .977   | .940    | .934                   | .946    | .940                  | .952    | 1.0625-6                                       |
| .972   | .981    | .977                   | .986    | .981                  | .990    | 1.0625-12                                      |
| .985   | .993    | .989                   | .997    | .993                  | 1.001   | 1.0625-14                                      |
| .995   | 1.002   | .998                   | 1.005   | 1.002                 | 1.009   | 1.0625-16                                      |
| 1.002  | 1.009   | 1.006                  | 1.012   | 1.009                 | 1.015   | 1.0625-18                                      |
| 1.008  | 1.014   | 1.011                  | 1.017   | 1.014                 | 1.020   | 1.0625-20                                      |
| 1.024  | 1.028   | 1.026                  | 1.030   | 1.028                 | 1.032   | 1.0625-28                                      |
| 0.970  | 0.984   | 0.977                  | 0.991   | 0.984                 | 0.998   | 1.125-7  |
| .990   | 1.002   | .996                   | 1.008   | 1.002                 | 1.015   | 1.125-8  |
| 1.035  | 1.044   | 1.039                  | 1.048   | 1.044                 | 1.053   | 1.125-12                                       |
| 1.057  | 1.064   | 1.061                  | 1.068   | 1.064                 | 1.071   | 1.125-16                                       |
| 1.065  | 1.071   | 1.068                  | 1.074   | 1.071                 | 1.078   | 1.125-18                                       |
| 1.071  | 1.077   | 1.074                  | 1.080   | 1.077                 | 1.082   | 1.125-20                                       |
| 1.086  | 1.090   | 1.088                  | 1.093   | 1.090                 | 1.095   | 1.125-28                                       |
| 1.052  | 1.065   | 1.058                  | 1.071   | 1.065                 | 1.077   | 1.1875-6                                       |
| 1.097  | 1.106   | 1.102                  | 1.111   | 1.106                 | 1.115   | 1.1875-12                                      |
| 1.120  | 1.127   | 1.123                  | 1.130   | 1.127                 | 1.134   | 1.1875-16                                      |
| 1.127  | 1.134   | 1.130                  | 1.137   | 1.134                 | 1.140   | 1.1875-18                                      |
| 1.133  | 1.139   | 1.136                  | 1.142   | 1.139                 | 1.145   | 1.1875-20                                      |
| 1.149  | 1.153   | 1.151                  | 1.155   | 1.153                 | 1.157   | 1.1875-28                                      |
| 1.095  | 1.109   | 1.102                  | 1.116   | 1.109                 | 1.123   | 1.250-7  |
| 1.115  | 1.127   | 1.121                  | 1.134   | 1.127                 | 1.140   | 1.250-8  |
| 1.160  | 1.169   | 1.164                  | 1.173   | 1.169                 | 1.178   | 1.250-12                                       |
| 1.182  | 1.189   | 1.186                  | 1.193   | 1.189                 | 1.196   | 1.250-16                                       |
| 1.190  | 1.196   | 1.193                  | 1.199   | 1.196                 | 1.203   | 1.250-18                                       |
| 1.196  | 1.202   | 1.199                  | 1.204   | 1.202                 | 1.207   | 1.250-20                                       |
| 1.211  | 1.216   | 1.213                  | 1.218   | 1.216                 | 1.220   | 1.250-28                                       |
| 1.177  | 1.190   | 1.184                  | 1.196   | 1.190                 | 1.202   | 1.3125-6                                       |
| 1.222  | 1.231   | 1.227                  | 1.236   | 1.231                 | 1.240   | 1.3125-12                                      |
| 1.245  | 1.252   | 1.248                  | 1.255   | 1.252                 | 1.259   | 1.3125-16                                      |
| 1.252  | 1.259   | 1.256                  | 1.262   | 1.259                 | 1.265   | 1.3125-18                                      |
| 1.258  | 1.264   | 1.261                  | 1.267   | 1.264                 | 1.270   | 1.3125-20                                      |
| 1.274  | 1.278   | 1.276                  | 1.280   | 1.278                 | 1.282   | 1.3125-28                                      |
| 1.195  | 1.210   | 1.202                  | 1.218   | 1.210                 | 1.225   | 1.375-6  |
| 1.240  | 1.252   | 1.246                  | 1.258   | 1.252                 | 1.265   | 1.375-8  |
| 1.285  | 1.294   | 1.289                  | 1.298   | 1.294                 | 1.303   | 1.375-12                                       |
| 1.307  | 1.314   | 1.311                  | 1.318   | 1.314                 | 1.321   | 1.375-16                                       |
| 1.315  | 1.321   | 1.318                  | 1.324   | 1.321                 | 1.328   | 1.375-18                                       |
| 1.321  | 1.327   | 1.324                  | 1.330   | 1.327                 | 1.332   | 1.375-20                                       |
| 1.336  | 1.340   | 1.338                  | 1.343   | 1.340                 | 1.345   | 1.375-28                                       |
| 1.257  | 1.272   | 1.265                  | 1.280   | 1.272                 | 1.288   | 1.4375-6                                       |
| 1.302  | 1.315   | 1.308                  | 1.321   | 1.315                 | 1.327   | 1.4375-8                                       |
| 1.347  | 1.356   | 1.352                  | 1.361   | 1.356                 | 1.365   | 1.4375-12                                      |
| 1.370  | 1.377   | 1.373                  | 1.380   | 1.377                 | 1.384   | 1.4375-16                                      |
| 1.377  | 1.384   | 1.380                  | 1.387   | 1.384                 | 1.390   | 1.4375-18                                      |
| 1.383  | 1.389   | 1.386                  | 1.392   | 1.389                 | 1.395   | 1.4375-20                                      |
| 1.399  | 1.403   | 1.401                  | 1.405   | 1.403                 | 1.407   | 1.4375-28                                      |
| 1.320  | 1.335   | 1.327                  | 1.343   | 1.335                 | 1.350   | 1.500-6  |
| 1.365  | 1.377   | 1.371                  | 1.384   | 1.377                 | 1.390   | 1.500-8  |
| 1.410  | 1.419   | 1.414                  | 1.423   | 1.419                 | 1.428   | 1.500-12                                       |
| 1.432  | 1.439   | 1.436                  | 1.443   | 1.439                 | 1.446   | 1.500-16                                       |
| 1.440  | 1.446   | 1.443                  | 1.449   | 1.446                 | 1.453   | 1.500-18                                       |
| 1.446  | 1.452   | 1.449                  | 1.454   | 1.452                 | 1.457   | 1.500-20                                       |
| 1.461  | 1.466   | 1.463                  | 1.468   | 1.466                 | 1.470   | 1.500-28                                       |

See footnotes at end of table.

## FED-STD-H28/2B

TABLE II.A.3 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, classes 1B and 2B (see 30.1) 1/ - continued

| Nominal size in inches<br>and threads per inch | Series<br>designation | Minor diameter of internal threads |                                       |                       |                                       |
|--|-----------------------|------------------------------------|---------------------------------------|-----------------------|---------------------------------------|
|  |                       | Minimum                            | Percent <sup>2/</sup><br>of<br>Thread | Maximum <sup>3/</sup> | Percent <sup>2/</sup><br>of<br>Thread |
| 1  | 2                     | 3                                  | 4                                     | 5                     | 6                                     |
|  |                       | in                                 |                                       | in                    |                                       |
| 1.5625-6                                       | 6UN                   | 1.382                              | 83.4                                  | 1.413                 | 69.1                                  |
| 1.5625-8                                       | 8UN                   | 1.427                              | 83.4                                  | 1.452                 | 68.1                                  |
| 1.5625-12                                      | 12UN                  | 1.472                              | 83.6                                  | 1.490                 | 67.0                                  |
| 1.5625-16                                      | 16UN                  | 1.495                              | 83.1                                  | 1.509                 | 65.9                                  |
| 1.5625-18                                      | UNEF                  | 1.502                              | 83.8                                  | 1.515                 | 65.8                                  |
| 1.5625-20                                      | 20UN                  | 1.508                              | 83.9                                  | 1.520                 | 65.4                                  |
| 1.625-6  | 6UN                   | 1.445                              | 83.1                                  | 1.475                 | 69.3                                  |
| 1.625-8  | 8UN                   | 1.490                              | 83.1                                  | 1.515                 | 67.7                                  |
| 1.625-12                                       | 12UN                  | 1.535                              | 83.1                                  | 1.553                 | 66.5                                  |
| 1.625-16                                       | 16UN                  | 1.557                              | 83.8                                  | 1.571                 | 66.5                                  |
| 1.625-18                                       | UNEF                  | 1.565                              | 83.1                                  | 1.578                 | 65.1                                  |
| 1.625-20                                       | 20UN                  | 1.571                              | 83.1                                  | 1.582                 | 66.2                                  |
| 1.6875-6                                       | 6UN                   | 1.507                              | 83.4                                  | 1.538                 | 69.1                                  |
| 1.6875-8                                       | 8UN                   | 1.552                              | 83.4                                  | 1.577                 | 68.1                                  |
| 1.6875-12                                      | 12UN                  | 1.597                              | 83.6                                  | 1.615                 | 67.0                                  |
| 1.6875-16                                      | 16UN                  | 1.620                              | 83.1                                  | 1.634                 | 65.9                                  |
| 1.6875-18                                      | UNEF                  | 1.627                              | 83.8                                  | 1.640                 | 65.8                                  |
| 1.6875-20                                      | 20UN                  | 1.633                              | 83.9                                  | 1.645                 | 65.4                                  |
| 1.750-5  | UNC                   | 1.534                              | 83.1                                  | 1.568                 | 70.1                                  |
| 1.750-6  | 6UN                   | 1.570                              | 83.1                                  | 1.600                 | 69.3                                  |
| 1.750-8  | 8UN                   | 1.615                              | 83.1                                  | 1.640                 | 67.7                                  |
| 1.750-12                                       | 12UN                  | 1.660                              | 83.1                                  | 1.678                 | 66.5                                  |
| 1.750-16                                       | 16UN                  | 1.682                              | 83.8                                  | 1.696                 | 66.5                                  |
| 1.750-20                                       | 20UN                  | 1.696                              | 83.1                                  | 1.707                 | 66.2                                  |
| 1.8125-6                                       | 6UN                   | 1.632                              | 83.4                                  | 1.663                 | 69.1                                  |
| 1.8125-8                                       | 8UN                   | 1.677                              | 83.4                                  | 1.702                 | 68.1                                  |
| 1.8125-12                                      | 12UN                  | 1.722                              | 83.6                                  | 1.740                 | 67.0                                  |
| 1.8125-16                                      | 16UN                  | 1.745                              | 83.1                                  | 1.759                 | 65.9                                  |
| 1.8125-20                                      | 20UN                  | 1.758                              | 83.9                                  | 1.770                 | 65.4                                  |
| 1.875-6  | 6UN                   | 1.695                              | 83.1                                  | 1.725                 | 69.3                                  |
| 1.875-8  | 8UN                   | 1.740                              | 83.1                                  | 1.765                 | 67.7                                  |
| 1.875-12                                       | 12UN                  | 1.785                              | 83.1                                  | 1.803                 | 66.5                                  |
| 1.875-16                                       | 16UN                  | 1.807                              | 83.8                                  | 1.821                 | 66.5                                  |
| 1.875-20                                       | 20UN                  | 1.821                              | 83.1                                  | 1.832                 | 66.2                                  |
| 1.9375-6                                       | 6UN                   | 1.757                              | 83.4                                  | 1.788                 | 69.1                                  |
| 1.9375-8                                       | 8UN                   | 1.802                              | 83.4                                  | 1.827                 | 68.1                                  |
| 1.9375-12                                      | 12UN                  | 1.847                              | 83.6                                  | 1.865                 | 67.0                                  |
| 1.9375-16                                      | 16UN                  | 1.870                              | 83.1                                  | 1.884                 | 65.9                                  |
| 1.9375-20                                      | 20UN                  | 1.883                              | 83.9                                  | 1.895                 | 65.4                                  |
| 2.000-4.5                                      | UNC                   | 1.759                              | 83.5                                  | 1.795                 | 71.0                                  |
| 2.000-6  | 6UN                   | 1.820                              | 83.1                                  | 1.850                 | 69.3                                  |
| 2.000-8  | 8UN                   | 1.865                              | 83.1                                  | 1.890                 | 67.7                                  |
| 2.000-12                                       | 12UN                  | 1.910                              | 83.1                                  | 1.928                 | 66.5                                  |
| 2.000-16                                       | 16UN                  | 1.932                              | 83.8                                  | 1.946                 | 66.5                                  |
| 2.000-20                                       | 20UN                  | 1.946                              | 83.1                                  | 1.957                 | 66.2                                  |

See footnotes at end of table.

TABLE II.A.3 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, classes 1B and 2B (see 30.1) 1/ - continued

| Recommended hole size limits for different lengths of engagement |         |                        |         |                       |         | Nominal size in inches and threads per inch |
|--|---------|------------------------|---------|-----------------------|---------|---|
| To and including 0.33D   |         | Above 0.33D thru 0.67D |         | Above 0.67D thru 1.5D |         |   |
| Minimum  | Maximum | Minimum                | Maximum | Minimum               | Maximum |   |
| 7  | 8       | 9                      | 10      | 11                    | 12      |   |
| in   | in      | in                     | in      | in                    | in      | 1   |
| 1.382  | 1.397   | 1.390                  | 1.405   | 1.397                 | 1.413   | 1.5625-6                                    |
| 1.427  | 1.440   | 1.434                  | 1.446   | 1.440                 | 1.452   | 1.5625-8                                    |
| 1.472  | 1.481   | 1.477                  | 1.486   | 1.481                 | 1.490   | 1.5625-12                                   |
| 1.495  | 1.502   | 1.498                  | 1.505   | 1.502                 | 1.509   | 1.5625-16                                   |
| 1.502  | 1.509   | 1.506                  | 1.512   | 1.509                 | 1.515   | 1.5625-18                                   |
| 1.508  | 1.514   | 1.511                  | 1.517   | 1.514                 | 1.520   | 1.5625-20                                   |
| 1.445  | 1.460   | 1.452                  | 1.468   | 1.460                 | 1.475   | 1.625-6                                     |
| 1.490  | 1.502   | 1.496                  | 1.508   | 1.502                 | 1.515   | 1.625-8                                     |
| 1.535  | 1.544   | 1.539                  | 1.548   | 1.544                 | 1.553   | 1.625-12                                    |
| 1.557  | 1.564   | 1.561                  | 1.568   | 1.564                 | 1.571   | 1.625-16                                    |
| 1.565  | 1.571   | 1.568                  | 1.574   | 1.571                 | 1.578   | 1.625-18                                    |
| 1.571  | 1.577   | 1.574                  | 1.580   | 1.577                 | 1.582   | 1.625-20                                    |
| 1.507  | 1.522   | 1.515                  | 1.530   | 1.522                 | 1.538   | 1.6875-6                                    |
| 1.552  | 1.565   | 1.558                  | 1.571   | 1.565                 | 1.577   | 1.6875-8                                    |
| 1.597  | 1.606   | 1.602                  | 1.611   | 1.606                 | 1.615   | 1.6875-12                                   |
| 1.620  | 1.627   | 1.623                  | 1.630   | 1.627                 | 1.634   | 1.6875-16                                   |
| 1.627  | 1.634   | 1.630                  | 1.637   | 1.634                 | 1.640   | 1.6875-18                                   |
| 1.633  | 1.639   | 1.636                  | 1.642   | 1.639                 | 1.645   | 1.6875-20                                   |
| 1.534  | 1.550   | 1.542                  | 1.559   | 1.550                 | 1.568   | 1.750-5                                     |
| 1.570  | 1.585   | 1.577                  | 1.593   | 1.585                 | 1.600   | 1.750-6                                     |
| 1.615  | 1.627   | 1.621                  | 1.634   | 1.627                 | 1.640   | 1.750-8                                     |
| 1.660  | 1.669   | 1.664                  | 1.673   | 1.669                 | 1.678   | 1.750-12                                    |
| 1.682  | 1.689   | 1.686                  | 1.693   | 1.689                 | 1.696   | 1.750-16                                    |
| 1.696  | 1.702   | 1.699                  | 1.704   | 1.702                 | 1.707   | 1.750-20                                    |
| 1.632  | 1.647   | 1.640                  | 1.655   | 1.647                 | 1.663   | 1.8125-6                                    |
| 1.677  | 1.690   | 1.684                  | 1.696   | 1.690                 | 1.702   | 1.8125-8                                    |
| 1.722  | 1.731   | 1.727                  | 1.736   | 1.731                 | 1.740   | 1.8125-12                                   |
| 1.745  | 1.752   | 1.748                  | 1.755   | 1.752                 | 1.759   | 1.8125-16                                   |
| 1.758  | 1.764   | 1.761                  | 1.767   | 1.764                 | 1.770   | 1.8125-20                                   |
| 1.695  | 1.710   | 1.702                  | 1.718   | 1.710                 | 1.725   | 1.875-6                                     |
| 1.740  | 1.752   | 1.746                  | 1.758   | 1.752                 | 1.765   | 1.875-8                                     |
| 1.785  | 1.794   | 1.789                  | 1.798   | 1.794                 | 1.803   | 1.875-12                                    |
| 1.807  | 1.814   | 1.811                  | 1.818   | 1.814                 | 1.821   | 1.875-16                                    |
| 1.821  | 1.827   | 1.824                  | 1.830   | 1.827                 | 1.832   | 1.875-20                                    |
| 1.757  | 1.772   | 1.765                  | 1.780   | 1.772                 | 1.788   | 1.9375-6                                    |
| 1.802  | 1.815   | 1.808                  | 1.821   | 1.815                 | 1.827   | 1.9375-8                                    |
| 1.847  | 1.856   | 1.852                  | 1.861   | 1.856                 | 1.865   | 1.9375-12                                   |
| 1.870  | 1.877   | 1.873                  | 1.880   | 1.877                 | 1.884   | 1.9375-16                                   |
| 1.883  | 1.889   | 1.886                  | 1.892   | 1.889                 | 1.895   | 1.9375-20                                   |
| 1.759  | 1.777   | 1.768                  | 1.786   | 1.777                 | 1.795   | 2.000-4.5                                   |
| 1.820  | 1.835   | 1.827                  | 1.843   | 1.835                 | 1.850   | 2.000-6                                     |
| 1.865  | 1.877   | 1.871                  | 1.884   | 1.877                 | 1.890   | 2.000-8                                     |
| 1.910  | 1.919   | 1.914                  | 1.923   | 1.919                 | 1.928   | 2.000-12                                    |
| 1.932  | 1.939   | 1.936                  | 1.943   | 1.939                 | 1.946   | 2.000-16                                    |
| 1.946  | 1.952   | 1.949                  | 1.954   | 1.952                 | 1.957   | 2.000-20                                    |

See footnotes at end of table.

## FED-STD-H28/2B

TABLE II.A.3 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, classes 1B and 2B (see 30.1)  $\frac{1}{2}$  - continued

| Nominal size in inches<br>and threads per inch | Series<br>designation | Minor diameter of internal threads |                                       |                       |                                       |
|--|-----------------------|------------------------------------|---------------------------------------|-----------------------|---------------------------------------|
|  |                       | Minimum                            | Percent <sup>2/</sup><br>of<br>Thread | Maximum <sup>3/</sup> | Percent <sup>2/</sup><br>of<br>Thread |
| 1  | 2                     | 3                                  | 4                                     | 5                     | 6                                     |
|  |                       | in                                 |                                       | in                    |                                       |
| 2.0625-16                                      | UNS                   | 1.995                              | 83.1                                  | 2.009                 | 65.9                                  |
| 2.125-6  | 6UN                   | 1.945                              | 83.1                                  | 1.975                 | 69.3                                  |
| 2.125-8  | 8UN                   | 1.990                              | 83.1                                  | 2.025                 | 67.7                                  |
| 2.125-12                                       | 12UN                  | 2.035                              | 83.1                                  | 2.053                 | 66.5                                  |
| 2.125-16                                       | 16UN                  | 2.057                              | 83.8                                  | 2.071                 | 66.5                                  |
| 2.125-20                                       | 20UN                  | 2.071                              | 83.1                                  | 2.082                 | 66.2                                  |
| 2.1875-16                                      | UNS                   | 2.120                              | 83.1                                  | 2.134                 | 65.9                                  |
| 2.250-4.5                                      | UNC                   | 2.009                              | 83.5                                  | 2.045                 | 71.0                                  |
| 2.250-6  | 6UN                   | 2.070                              | 83.1                                  | 2.100                 | 69.3                                  |
| 2.500-4  | UNC                   | 2.229                              | 83.4                                  | 2.267                 | 71.7                                  |
| 2.750-4  | UNC                   | 2.479                              | 83.4                                  | 2.517                 | 71.7                                  |
| 3.000-4  | UNC                   | 2.729                              | 83.4                                  | 2.767                 | 71.7                                  |
| 3.250-4  | UNC                   | 2.979                              | 83.4                                  | 3.017                 | 71.7                                  |

See footnotes at end of table.

TABLE II.A.3 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, classes 1B and 2B (see 30.1) 1/ - continued

| Recommended hole size limits for different lengths of engagement |         |                        |         |                       |         | Nominal size in inches and threads per inch |
|--|---------|------------------------|---------|-----------------------|---------|---|
| To and including 0.33D   |         | Above 0.33D thru 0.67D |         | Above 0.67D thru 1.5D |         |   |
| Minimum  | Maximum | Minimum                | Maximum | Minimum               | Maximum |   |
| 7  | 8       | 9                      | 10      | 11                    | 12      | 1   |
| in   | in      | in                     | in      | in                    | in      |   |
| 1.995  | 2.002   | 1.998                  | 2.005   | 2.002                 | 2.009   | 2.0625-16                                   |
| 1.945  | 1.960   | 1.952                  | 1.968   | 1.960                 | 1.975   | 2.125-6                                     |
| 1.990  | 2.002   | 1.996                  | 2.008   | 2.002                 | 2.015   | 2.125-8                                     |
| 2.035  | 2.044   | 2.039                  | 2.048   | 2.044                 | 2.053   | 2.125-12                                    |
| 2.057  | 2.064   | 2.061                  | 2.068   | 2.064                 | 2.071   | 2.125-16                                    |
| 2.071  | 2.077   | 2.074                  | 2.080   | 2.077                 | 2.082   | 2.125-20                                    |
| 2.120  | 2.127   | 2.123                  | 2.130   | 2.127                 | 2.134   | 2.1875-16                                   |
| 2.009  | 2.027   | 2.018                  | 2.036   | 2.027                 | 2.045   | 2.250-4.5                                   |
| 2.070  | 2.085   | 2.077                  | 2.093   | 2.085                 | 2.100   | 2.250-6                                     |
| 2.229  | 2.248   | 2.239                  | 2.258   | 2.248                 | 2.267   | 2.500-4                                     |
| 2.479  | 2.498   | 2.489                  | 2.508   | 2.498                 | 2.517   | 2.750-4                                     |
| 2.729  | 2.748   | 2.739                  | 2.758   | 2.748                 | 2.767   | 3.000-4                                     |
| 2.979  | 2.998   | 2.989                  | 3.008   | 2.998                 | 3.017   | 3.250-4                                     |

1/ The differences between limits are equal to the minor diameter tolerances for lengths of engagement to and including 0.33D. However, the minimum values for lengths of engagement greater than 0.33D in sizes 0.25 in. and larger are adjusted so that the difference between limits is never less than 0.0040 in. For diameter-pitch combinations other than those given in this table, see 30.2.

Hole size limits for diameter-pitch combinations which do not appear in this table may be obtained by use of values in this table provided there is a diameter-pitch combination in the table:

- (1) with the same pitch and
- (2) with a diameter that is less by an integral amount than the diameter-pitch combination for which hole size values are desired. (NOTE: Values in the table for nominal sizes less than 0.25 in. cannot be used for this purpose.)

EXAMPLE: To obtain the values for the 4.000-8UN-1B or 2B thread, add 2.000 to values for the 2.000-8UN thread shown in the table. These values would then become: 3.865, 3.877, 3.871, 3.884, 3.877, 3.890. The percentages of thread will remain unchanged.

2/ Based on values as rounded off in the preceding column. 100 percent of thread = 0.75B (see 20.2.3).

3/ Based on a length of engagement equal to the nominal diameter.

## FED-STD-H28/2B

TABLE II.A.4 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, class 3B (see 30.1)  $\frac{1}{2}$ 

| Nominal size in inches<br>and threads per inch | Series<br>designation | Minor diameter of internal threads |                                       |                       |                                       |
|--|-----------------------|------------------------------------|---------------------------------------|-----------------------|---------------------------------------|
|  |                       | Minimum                            | Percent <sup>2/</sup><br>of<br>Thread | Maximum <sup>3/</sup> | Percent <sup>2/</sup><br>of<br>Thread |
| 1  | 2                     | 3                                  | 4                                     | 5                     | 6                                     |
| .060-80 or No. 0-80                            | UNF                   | in<br>0.0465                       | 83.1                                  | in<br>0.0514          | 53.0                                  |
| .073-64 or No. 1-64                            | UNC                   | .0561                              | 83.3                                  | .0623                 | 52.7                                  |
| .073-72 or No. 1-72                            | UNF                   | .0580                              | 83.1                                  | .0635                 | 52.7                                  |
| .086-56 or No. 2-56                            | UNC                   | .0667                              | 83.2                                  | .0737                 | 53.0                                  |
| .086-64 or No. 2-64                            | UNF                   | .0691                              | 83.3                                  | .0753                 | 52.7                                  |
| .099-48 or No. 3-48                            | UNC                   | .0764                              | 83.5                                  | .0845                 | 53.6                                  |
| .099-56 or No. 3-56                            | UNF                   | .0797                              | 83.2                                  | .0865                 | 53.9                                  |
| .112-40 or No. 4-40                            | UNC                   | .0849                              | 83.4                                  | .0939                 | 55.7                                  |
| .112-48 or No. 4-48                            | UNF                   | .0894                              | 83.5                                  | .0968                 | 56.2                                  |
| .125-40 or No. 5-40                            | UNC                   | .0979                              | 83.4                                  | .1062                 | 57.9                                  |
| .125-44 or No. 5-44                            | UNF                   | .1004                              | 83.3                                  | .1079                 | 57.9                                  |
| .138-32 or No. 6-32                            | UNC                   | .1040                              | 83.8                                  | .1140                 | 59.1                                  |
| .138-40 or No. 6-40                            | UNF                   | .1110                              | 83.1                                  | .1186                 | 59.7                                  |
| .164-32 or No. 8-32                            | UNC                   | .1300                              | 83.8                                  | .1389                 | 61.8                                  |
| .164-36 or No. 8-36                            | UNF                   | .1340                              | 83.1                                  | .1416                 | 62.1                                  |
| .190-24 or No. 10-24                           | UNC                   | .1450                              | 83.1                                  | .1555                 | 63.7                                  |
| .190-32 or No. 10-32                           | UNF                   | .1560                              | 83.8                                  | .1641                 | 63.8                                  |
| .216-24 or No. 12-24                           | UNC                   | .1710                              | 83.1                                  | .1807                 | 65.2                                  |
| .216-28 or No. 12-28                           | UNF                   | .1770                              | 84.1                                  | .1857                 | 65.3                                  |
| .216-32 or No. 12-32                           | UNEF                  | .1820                              | 83.8                                  | .1895                 | 65.3                                  |
| .250-20  | UNC                   | .1960                              | 83.1                                  | .2067                 | 66.7                                  |
| .250-28  | UNF                   | .2110                              | 84.1                                  | .2190                 | 66.8                                  |
| .250-32  | UNEF                  | .2160                              | 83.8                                  | .2229                 | 66.8                                  |
| .250-36  | UNS                   | .2200                              | 83.1                                  | .2258                 | 67.1                                  |
| .3125-18                                       | UNC                   | .2520                              | 83.8                                  | .2630                 | 68.6                                  |
| .3125-20                                       | 20UN                  | .2580                              | 83.9                                  | .2680                 | 68.5                                  |
| .3125-24                                       | UNF                   | .2670                              | 84.1                                  | .2754                 | 68.5                                  |
| .3125-28                                       | 28UN                  | .2740                              | 83.0                                  | .2807                 | 68.5                                  |
| .3125-32                                       | UNEF                  | .2790                              | 82.5                                  | .2847                 | 68.5                                  |
| .3125-36                                       | UNS                   | .2820                              | 84.5                                  | .2877                 | 68.7                                  |
| .375-16  | UNC                   | .3070                              | 83.8                                  | .3182                 | 70.0                                  |
| .375-20  | 20UN                  | .3210                              | 83.1                                  | .3297                 | 69.7                                  |
| .375-24  | UNF                   | .3300                              | 83.1                                  | .3372                 | 69.8                                  |
| .375-28  | 28UN                  | .3360                              | 84.1                                  | .3426                 | 69.8                                  |
| .375-32  | UNEF                  | .3410                              | 83.8                                  | .3469                 | 69.2                                  |
| .375-36  | UNS                   | .3450                              | 83.1                                  | .3501                 | 69.0                                  |
| .4375-14                                       | UNC                   | .3600                              | 83.5                                  | .3717                 | 70.9                                  |
| .4375-16                                       | 16UN                  | .3700                              | 83.1                                  | .3800                 | 70.8                                  |
| .4375-20                                       | UNF                   | .3830                              | 83.9                                  | .3916                 | 70.7                                  |
| .4375-28                                       | UNEF                  | .3990                              | 83.0                                  | .4051                 | 69.8                                  |
| .4375-32                                       | 32UN                  | .4040                              | 82.5                                  | .4094                 | 69.2                                  |

See footnotes at end of table.

TABLE II.A.4 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, class 3B (see 30.1) 1/ - continued

| Recommended hole size limits for different lengths of engagement |         |                        |         |                       |         | Nominal size in inches<br>and threads per inch |
|--|---------|------------------------|---------|-----------------------|---------|--|
| To and including 0.33D   |         | Above 0.33D thru 0.67D |         | Above 0.67D thru 1.5D |         |  |
| Minimum  | Maximum | Minimum                | Maximum | Minimum               | Maximum |  |
| 7  | 8       | 9                      | 10      | 11                    | 12      | 1  |
| in   | in      | in                     | in      | in                    | in      |  |
| 0.0465   | 0.0500  | 0.0479                 | 0.0514  | 0.0479                | 0.0514  | .060-80 or No. 0-80                            |
| .0561  | .0599   | .0580                  | .0618   | .0585                 | .0623   | .073-64 or No. 1-64                            |
| .0580  | .0613   | .0596                  | .0629   | .0602                 | .0635   | .073-72 or No. 1-72                            |
| .0667  | .0705   | .0686                  | .0724   | .0699                 | .0737   | .086-56 or No. 2-56                            |
| .0691  | .0724   | .0707                  | .0740   | .0720                 | .0753   | .086-64 or No. 2-64                            |
| .0764  | .0804   | .0785                  | .0825   | .0805                 | .0845   | .099-48 or No. 3-48                            |
| .0797  | .0831   | .0814                  | .0848   | .0831                 | .0865   | .099-56 or No. 3-56                            |
| .0849  | .0894   | .0871                  | .0916   | .0894                 | .0939   | .112-40 or No. 4-40                            |
| .0894  | .0931   | .0912                  | .0949   | .0931                 | .0968   | .112-48 or No. 4-48                            |
| .0979  | .1020   | .1000                  | .1041   | .1021                 | .1062   | .125-40 or No. 5-40                            |
| .1004  | .1041   | .1023                  | .1060   | .1042                 | .1079   | .125-44 or No. 5-44                            |
| .1040  | .1091   | .1066                  | .1115   | .1091                 | .1140   | .138-32 or No. 6-32                            |
| .1110  | .1148   | .1128                  | .1167   | .1147                 | .1186   | .138-40 or No. 6-40                            |
| .1300  | .1345   | .1324                  | .1367   | .1346                 | .1389   | .164-32 or No. 8-32                            |
| .1340  | .1377   | .1359                  | .1397   | .1378                 | .1416   | .164-36 or No. 8-36                            |
| .1450  | .1502   | .1475                  | .1528   | .1502                 | .1555   | .190-24 or No. 10-24                           |
| .1560  | .1601   | .1582                  | .1621   | .1602                 | .1641   | .190-32 or No. 10-32                           |
| .1710  | .1758   | .1733                  | .1782   | .1758                 | .1807   | .216-24 or No. 12-24                           |
| .1770  | .1815   | .1794                  | .1836   | .1815                 | .1857   | .216-28 or No. 12-28                           |
| .1820  | .1858   | .1841                  | .1877   | .1859                 | .1895   | .216-32 or No. 12-32                           |
| .1960  | .2013   | .1986                  | .2040   | .2013                 | .2067   | .250-20  |
| .2110  | .2152   | .2131                  | .2171   | .2150                 | .2190   | .250-28  |
| .2160  | .2196   | .2172                  | .2212   | .2189                 | .2229   | .250-32  |
| .2200  | .2229   | .2203                  | .2243   | .2218                 | .2258   | .250-36  |
| .2520  | .2577   | .2551                  | .2604   | .2577                 | .2630   | .3125-18                                       |
| .2580  | .2632   | .2608                  | .2656   | .2632                 | .2680   | .3125-20                                       |
| .2670  | .2714   | .2694                  | .2734   | .2714                 | .2754   | .3125-24                                       |
| .2740  | .2772   | .2749                  | .2789   | .2767                 | .2807   | .3125-28                                       |
| .2790  | .2817   | .2792                  | .2832   | .2807                 | .2847   | .3125-32                                       |
| .2820  | .2850   | .2823                  | .2863   | .2837                 | .2877   | .3125-36                                       |
| .3070  | .3127   | .3101                  | .3155   | .3128                 | .3182   | .375-16  |
| .3210  | .3253   | .3231                  | .3275   | .3253                 | .3297   | .375-20  |
| .3300  | .3336   | .3314                  | .3354   | .3332                 | .3372   | .375-24  |
| .3360  | .3395   | .3370                  | .3410   | .3386                 | .3426   | .375-28  |
| .3410  | .3441   | .3415                  | .3455   | .3429                 | .3469   | .375-32  |
| .3450  | .3475   | .3450                  | .3490   | .3461                 | .3501   | .375-36  |
| .3600  | .3660   | .3630                  | .3688   | .3659                 | .3717   | .4375-14                                       |
| .3700  | .3749   | .3723                  | .3774   | .3749                 | .3800   | .4375-16                                       |
| .3830  | .3875   | .3855                  | .3896   | .3875                 | .3916   | .4375-20                                       |
| .3990  | .4020   | .3995                  | .4035   | .4011                 | .4051   | .4375-28                                       |
| .4040  | .4066   | .4040                  | .4080   | .4054                 | .4094   | .4375-32                                       |

See footnotes at end of table.

## FED-STD-H28/2B

TABLE II.A.4 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, class 3B (see 30.1) <sup>1/</sup> - continued

| Nominal size in inches<br>and threads per inch | Series<br>designation | Minor diameter of internal threads |                                       |                       |                                       |
|--|-----------------------|------------------------------------|---------------------------------------|-----------------------|---------------------------------------|
|  |                       | Minimum                            | Percent <sup>2/</sup><br>of<br>Thread | Maximum <sup>3/</sup> | Percent <sup>2/</sup><br>of<br>Thread |
|  |                       |                                    |                                       |                       |                                       |
| 1  | 2                     | 3                                  | 4                                     | 5                     | 6                                     |
|  |                       | in                                 |                                       | in                    |                                       |
| .500-12  | UNS                   | .4100                              | 83.1                                  | .4223                 | 71.8                                  |
| .500-13  | UNC                   | .4170                              | 83.1                                  | .4284                 | 71.7                                  |
| .500-16  | 16UN                  | .4320                              | 83.8                                  | .4419                 | 71.6                                  |
| .500-20  | UNF                   | .4460                              | 83.1                                  | .4537                 | 71.3                                  |
| .500-28  | UNEF                  | .4610                              | 84.1                                  | .4676                 | 69.8                                  |
| .500-32  | 32UN                  | .4660                              | 83.8                                  | .4719                 | 69.2                                  |
| .5625-12                                       | UNC                   | .4720                              | 83.6                                  | .4843                 | 72.2                                  |
| .5625-16                                       | 16UN                  | .4950                              | 83.1                                  | .5040                 | 72.1                                  |
| .5625-18                                       | UNF                   | .5020                              | 83.8                                  | .5106                 | 71.9                                  |
| .5625-20                                       | 20UN                  | .5080                              | 83.9                                  | .5162                 | 71.3                                  |
| .5625-24                                       | UNEF                  | .5170                              | 84.1                                  | .5244                 | 70.4                                  |
| .5625-28                                       | 28UN                  | .5240                              | 83.0                                  | .5301                 | 69.8                                  |
| .5625-32                                       | 32UN                  | .5290                              | 82.5                                  | .5344                 | 69.2                                  |
| .625-11  | UNC                   | .5270                              | 83.0                                  | .5391                 | 72.7                                  |
| .625-12  | 12UN                  | .5350                              | 83.1                                  | .5463                 | 72.7                                  |
| .625-16  | 16UN                  | .5570                              | 83.8                                  | .5662                 | 72.4                                  |
| .625-18  | UNF                   | .5650                              | 83.1                                  | .5730                 | 72.1                                  |
| .625-20  | 20UN                  | .5710                              | 83.1                                  | .5787                 | 71.3                                  |
| .625-24  | UNEF                  | .5800                              | 83.1                                  | .5869                 | 70.4                                  |
| .625-28  | 28UN                  | .5860                              | 84.1                                  | .5926                 | 69.8                                  |
| .625-32  | 32UN                  | .5910                              | 83.8                                  | .5969                 | 69.2                                  |
| .6875-12                                       | 12UN                  | .5970                              | 83.6                                  | .6085                 | 73.0                                  |
| .6875-16                                       | 16UN                  | .6200                              | 83.1                                  | .6284                 | 72.8                                  |
| .6875-18                                       | UNS                   | .6270                              | 83.8                                  | .6355                 | 72.1                                  |
| .6875-20                                       | 20UN                  | .6330                              | 83.9                                  | .6412                 | 71.3                                  |
| .6875-24                                       | UNEF                  | .6420                              | 84.1                                  | .6494                 | 70.4                                  |
| .6875-28                                       | 28UN                  | .6490                              | 83.0                                  | .6551                 | 69.8                                  |
| .6875-32                                       | 32UN                  | .6540                              | 82.5                                  | .6594                 | 69.2                                  |
| .750-10  | UNC                   | .6420                              | 83.1                                  | .6545                 | 73.5                                  |
| .750-12  | 12UN                  | .6600                              | 83.1                                  | .6707                 | 73.3                                  |
| .750-16  | UNF                   | .6820                              | 83.8                                  | .6908                 | 72.9                                  |
| .750-18  | UNS                   | .6900                              | 83.1                                  | .6980                 | 72.1                                  |
| .750-20  | UNEF                  | .6960                              | 83.1                                  | .7037                 | 71.3                                  |
| .750-28  | 28UN                  | .7110                              | 84.1                                  | .7176                 | 69.8                                  |
| .750-32  | 32UN                  | .7160                              | 83.8                                  | .7219                 | 69.2                                  |
| .8125-12                                       | 12UN                  | .7220                              | 83.6                                  | .7329                 | 73.5                                  |
| .8125-16                                       | 16UN                  | .7450                              | 83.1                                  | .7533                 | 72.9                                  |
| .8125-18                                       | UNS                   | .7520                              | 83.8                                  | .7605                 | 72.1                                  |
| .8125-20                                       | UNEF                  | .7580                              | 83.9                                  | .7662                 | 71.3                                  |
| .8125-28                                       | 28UN                  | .7740                              | 83.0                                  | .7801                 | 69.8                                  |
| .8125-32                                       | 32UN                  | .7790                              | 82.5                                  | .7844                 | 69.2                                  |
| .875-9   | UNC                   | .7550                              | 83.1                                  | .7681                 | 74.1                                  |
| .875-12  | 12UN                  | .7850                              | 83.1                                  | .7952                 | 73.7                                  |
| .875-14  | UNF                   | .7980                              | 83.0                                  | .8068                 | 73.5                                  |
| .875-16  | 16UN                  | .8070                              | 83.8                                  | .8158                 | 72.9                                  |
| .875-18  | UNS                   | .8150                              | 83.1                                  | .8230                 | 72.1                                  |
| .875-20  | UNEF                  | .8210                              | 83.1                                  | .8287                 | 71.3                                  |
| .875-28  | 28UN                  | .8360                              | 84.1                                  | .8426                 | 69.8                                  |
| .875-32  | 32UN                  | .8410                              | 83.8                                  | .8469                 | 69.2                                  |
| .9375-12                                       | 12UN                  | .8470                              | 83.6                                  | .8575                 | 73.9                                  |
| .9375-16                                       | 16UN                  | .8700                              | 83.1                                  | .8783                 | 72.9                                  |
| .9375-20                                       | UNEF                  | .8830                              | 83.9                                  | .8912                 | 71.3                                  |
| .9375-28                                       | 28UN                  | .8990                              | 83.0                                  | .9051                 | 69.8                                  |
| .9375-32                                       | 32UN                  | .9040                              | 82.5                                  | .9094                 | 69.2                                  |

See footnotes at end of table.



TABLE II.A.4 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, class 3B (see 30.1) 1/ - continued

| Recommended hole size limits for different lengths of engagement |         |                        |         |                       |         | Nominal size in inches<br>and threads per inch |
|--|---------|------------------------|---------|-----------------------|---------|--|
| To and including 0.33D   |         | Above 0.33D thru 0.67D |         | Above 0.67D thru 1.5D |         |  |
| Minimum  | Maximum | Minimum                | Maximum | Minimum               | Maximum |  |
| 7  | 8       | 9                      | 10      | 11                    | 12      | 1  |
| in   | in      | in                     | in      | in                    | in      |  |
| .4100  | .4161   | .4129                  | .4192   | .4160                 | .4223   | .500-12  |
| .4170  | .4225   | .4196                  | .4254   | .4226                 | .4284   | .500-13  |
| .4320  | .4371   | .4347                  | .4395   | .4371                 | .4419   | .500-16  |
| .4460  | .4498   | .4477                  | .4517   | .4497                 | .4537   | .500-20  |
| .4610  | .4645   | .4620                  | .4660   | .4636                 | .4676   | .500-28  |
| .4660  | .4691   | .4665                  | .4705   | .4679                 | .4719   | .500-32  |
| .4720  | .4783   | .4753                  | .4813   | .4783                 | .4843   | .5625-12                                       |
| .4950  | .4994   | .4971                  | .5017   | .4994                 | .5040   | .5625-16                                       |
| .5020  | .5065   | .5045                  | .5086   | .5065                 | .5106   | .5625-18                                       |
| .5080  | .5123   | .5102                  | .5142   | .5122                 | .5162   | .5625-20                                       |
| .5170  | .5209   | .5186                  | .5226   | .5204                 | .5244   | .5625-24                                       |
| .5240  | .5270   | .5245                  | .5285   | .5261                 | .5301   | .5625-28                                       |
| .5290  | .5316   | .5290                  | .5330   | .5304                 | .5344   | .5625-32                                       |
| .5270  | .5328   | .5298                  | .5360   | .5329                 | .5391   | .625-11  |
| .5350  | .5406   | .5377                  | .5435   | .5405                 | .5463   | .625-12  |
| .5570  | .5617   | .5596                  | .5640   | .5618                 | .5662   | .625-16  |
| .5650  | .5690   | .5669                  | .5710   | .5689                 | .5730   | .625-18  |
| .5710  | .5748   | .5727                  | .5767   | .5747                 | .5787   | .625-20  |
| .5800  | .5834   | .5811                  | .5851   | .5829                 | .5869   | .625-24  |
| .5860  | .5895   | .5870                  | .5910   | .5886                 | .5926   | .625-28  |
| .5910  | .5941   | .5915                  | .5955   | .5929                 | .5969   | .625-32  |
| .5970  | .6029   | .6001                  | .6057   | .6029                 | .6085   | .6875-12                                       |
| .6200  | .6241   | .6219                  | .6262   | .6241                 | .6284   | .6875-16                                       |
| .6270  | .6315   | .6294                  | .6335   | .6314                 | .6355   | .6875-18                                       |
| .6330  | .6373   | .6352                  | .6392   | .6372                 | .6412   | .6875-20                                       |
| .6420  | .6459   | .6436                  | .6476   | .6454                 | .6494   | .6875-24                                       |
| .6490  | .6520   | .6495                  | .6535   | .6511                 | .6551   | .6875-28                                       |
| .6540  | .6566   | .6540                  | .6580   | .6554                 | .6594   | .6875-32                                       |
| .6420  | .6481   | .6449                  | .6513   | .6481                 | .6545   | .750-10  |
| .6600  | .6652   | .6626                  | .6680   | .6653                 | .6707   | .750-12  |
| .6820  | .6866   | .6844                  | .6887   | .6865                 | .6908   | .750-16  |
| .6900  | .6940   | .6919                  | .6960   | .6939                 | .6980   | .750-18  |
| .6960  | .6998   | .6977                  | .7017   | .6997                 | .7037   | .750-20  |
| .7110  | .7145   | .7120                  | .7160   | .7136                 | .7176   | .750-28  |
| .7160  | .7191   | .7165                  | .7205   | .7179                 | .7219   | .750-32  |
| .7220  | .7276   | .7250                  | .7303   | .7276                 | .7329   | .8125-12                                       |
| .7450  | .7491   | .7469                  | .7512   | .7490                 | .7533   | .8125-16                                       |
| .7520  | .7565   | .7544                  | .7585   | .7564                 | .7605   | .8125-18                                       |
| .7580  | .7623   | .7602                  | .7642   | .7622                 | .7662   | .8125-20                                       |
| .7740  | .7770   | .7745                  | .7785   | .7761                 | .7801   | .8125-28                                       |
| .7790  | .7816   | .7790                  | .7830   | .7804                 | .7844   | .8125-32                                       |
| .7550  | .7614   | .7580                  | .7647   | .7614                 | .7681   | .875-9   |
| .7850  | .7900   | .7874                  | .7926   | .7900                 | .7952   | .875-12  |
| .7980  | .8022   | .8000                  | .8045   | .8023                 | .8068   | .875-14  |
| .8070  | .8116   | .8094                  | .8137   | .8115                 | .8158   | .875-16  |
| .8150  | .8190   | .8169                  | .8210   | .8189                 | .8230   | .875-18  |
| .8210  | .8248   | .8227                  | .8267   | .8247                 | .8287   | .875-20  |
| .8360  | .8395   | .8370                  | .8410   | .8386                 | .8426   | .875-28  |
| .8410  | .8441   | .8415                  | .8455   | .8429                 | .8469   | .875-32  |
| .8470  | .8524   | .8499                  | .8550   | .8524                 | .8575   | .9375-12                                       |
| .8700  | .8741   | .8719                  | .8762   | .8740                 | .8783   | .9375-16                                       |
| .8830  | .8873   | .8852                  | .8892   | .8872                 | .8912   | .9375-20                                       |
| .8990  | .9020   | .8995                  | .9035   | .9011                 | .9051   | .9375-28                                       |
| .9040  | .9066   | .9040                  | .9080   | .9054                 | .9094   | .9375-32                                       |

See footnotes at end of table.

## FED-STD-H28/2B

TABLE II.A.4 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, class 3B (see 30.1)  $\frac{1}{2}$  - continued

| Nominal size in inches and threads per inch | Series designation | Minor diameter of internal threads |                                 |                       |                                 |
|---|--------------------|------------------------------------|---------------------------------|-----------------------|---------------------------------|
|   |                    | Minimum                            | Percent <sup>2/</sup> of Thread | Maximum <sup>3/</sup> | Percent <sup>2/</sup> of Thread |
| 1   | 2                  | 3                                  | 4                               | 5                     | 6                               |
|   |                    | in                                 |                                 | in                    |                                 |
| 1.000-8                                     | UNC                | .8650                              | 83.1                            | .8797                 | 74.1                            |
| 1.000-12                                    | UNF                | .9100                              | 83.1                            | .9198                 | 74.1                            |
| 1.000-14                                    | UNS                | .9230                              | 83.0                            | .9315                 | 73.8                            |
| 1.000-16                                    | 16UN               | .9320                              | 83.8                            | .9408                 | 72.9                            |
| 1.000-18                                    | UNS                | .9400                              | 83.1                            | .9480                 | 72.1                            |
| 1.000-20                                    | UNEF               | .9460                              | 83.1                            | .9537                 | 71.3                            |
| 1.000-28                                    | 28UN               | .9610                              | 84.1                            | .9676                 | 69.8                            |
| 1.000-32                                    | 32UN               | .9660                              | 83.8                            | .9719                 | 69.2                            |
| 1.0625-8                                    | 8UN                | .9270                              | 83.4                            | .9422                 | 74.1                            |
| 1.0625-12                                   | 12UN               | .9720                              | 83.6                            | .9823                 | 74.1                            |
| 1.0625-14                                   | UNS                | .9850                              | 83.5                            | .9940                 | 73.8                            |
| 1.0625-16                                   | 16UN               | .9950                              | 83.1                            | 1.0033                | 72.9                            |
| 1.0625-18                                   | UNEF               | 1.0020                             | 83.8                            | 1.0105                | 72.1                            |
| 1.0625-20                                   | 20UN               | 1.0080                             | 83.9                            | 1.0162                | 71.3                            |
| 1.0625-28                                   | 28UN               | 1.0240                             | 83.0                            | 1.0301                | 69.8                            |
| 1.125-7                                     | UNC                | 0.9700                             | 83.5                            | 0.9875                | 74.1                            |
| 1.125-8                                     | 8UN                | .9900                              | 83.1                            | 1.0047                | 74.1                            |
| 1.125-12                                    | UNF                | 1.0350                             | 83.1                            | 1.0448                | 74.1                            |
| 1.125-16                                    | 16UN               | 1.0570                             | 83.8                            | 1.0658                | 72.9                            |
| 1.125-18                                    | UNEF               | 1.0650                             | 83.1                            | 1.0730                | 72.1                            |
| 1.125-20                                    | 20UN               | 1.0710                             | 83.1                            | 1.0787                | 71.3                            |
| 1.125-28                                    | 28UN               | 1.0860                             | 84.1                            | 1.0926                | 69.8                            |
| 1.1875-8                                    | 8UN                | 1.0520                             | 83.4                            | 1.0672                | 74.1                            |
| 1.1875-12                                   | 12UN               | 1.0970                             | 83.6                            | 1.1073                | 74.1                            |
| 1.1875-16                                   | 16UN               | 1.1200                             | 83.1                            | 1.1283                | 72.9                            |
| 1.1875-18                                   | UNEF               | 1.1270                             | 83.8                            | 1.1355                | 72.1                            |
| 1.1875-20                                   | 20UN               | 1.1330                             | 83.9                            | 1.1412                | 71.3                            |
| 1.1875-28                                   | 28UN               | 1.1490                             | 83.0                            | 1.1551                | 69.8                            |
| 1.250-7                                     | UNC                | 1.0950                             | 83.5                            | 1.1125                | 74.1                            |
| 1.250-8                                     | 8UN                | 1.1150                             | 83.1                            | 1.1297                | 74.1                            |
| 1.250-12                                    | UNF                | 1.1600                             | 83.1                            | 1.1698                | 74.1                            |
| 1.250-16                                    | 16UN               | 1.1820                             | 83.8                            | 1.1908                | 72.9                            |
| 1.250-18                                    | UNEF               | 1.1900                             | 83.1                            | 1.1980                | 72.1                            |
| 1.250-20                                    | 20UN               | 1.1960                             | 83.1                            | 1.2037                | 71.3                            |
| 1.250-28                                    | 28UN               | 1.2110                             | 84.1                            | 1.2176                | 69.8                            |
| 1.3125-8                                    | 8UN                | 1.1770                             | 83.4                            | 1.1922                | 74.1                            |
| 1.3125-12                                   | 12UN               | 1.2220                             | 83.6                            | 1.2323                | 74.1                            |
| 1.3125-16                                   | 16UN               | 1.2450                             | 83.1                            | 1.2533                | 72.9                            |
| 1.3125-18                                   | UNEF               | 1.2520                             | 83.8                            | 1.2605                | 72.1                            |
| 1.3125-20                                   | 20UN               | 1.2528                             | 83.9                            | 1.2662                | 71.3                            |
| 1.3125-28                                   | 28UN               | 1.2740                             | 83.0                            | 1.2801                | 69.8                            |
| 1.375-6                                     | UNC                | 1.1950                             | 83.1                            | 1.2146                | 74.1                            |
| 1.375-8                                     | 8UN                | 1.2400                             | 83.1                            | 1.2547                | 74.1                            |
| 1.375-12                                    | UNF                | 1.2850                             | 83.1                            | 1.2948                | 74.1                            |
| 1.375-16                                    | 16UN               | 1.3070                             | 83.8                            | 1.3158                | 72.9                            |
| 1.375-18                                    | UNEF               | 1.3150                             | 83.1                            | 1.3230                | 72.1                            |
| 1.375-20                                    | 20UN               | 1.3210                             | 83.1                            | 1.3287                | 71.3                            |
| 1.375-28                                    | 28UN               | 1.3360                             | 84.1                            | 1.3426                | 69.8                            |
| 1.4375-6                                    | 6UN                | 1.2570                             | 83.4                            | 1.2771                | 74.1                            |
| 1.4375-8                                    | 8UN                | 1.3020                             | 83.4                            | 1.3172                | 74.1                            |
| 1.4375-12                                   | 12UN               | 1.3470                             | 83.6                            | 1.3573                | 74.1                            |
| 1.4375-16                                   | 16UN               | 1.3700                             | 83.1                            | 1.3783                | 72.9                            |
| 1.4375-18                                   | UNEF               | 1.3770                             | 83.8                            | 1.3855                | 72.1                            |
| 1.4375-20                                   | 20UN               | 1.3830                             | 83.9                            | 1.3912                | 71.3                            |
| 1.4375-28                                   | 28UN               | 1.3990                             | 83.0                            | 1.4051                | 69.8                            |

See footnotes at end of table.

TABLE II.A.4 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, class 3B (see 30.1) 1/ - continued

| Recommended hole size limits for different lengths of engagement |         |                        |         |                       |         | Nominal size in inches<br>and threads per inch |
|--|---------|------------------------|---------|-----------------------|---------|--|
| To and including 0.33D   |         | Above 0.33D thru 0.67D |         | Above 0.67D thru 1.5D |         |  |
| Minimum  | Maximum | Minimum                | Maximum | Minimum               | Maximum |  |
| 7  | 8       | 9                      | 10      | 11                    | 12      |  |
| in   | in      | in                     | in      | in                    | in      |  |
| .8650  | .8722   | .8684                  | .8759   | .8722                 | .8797   | 1.000-8  |
| .9100  | .9148   | .9123                  | .9173   | .9148                 | .9198   | 1.000-12                                       |
| .9230  | .9271   | .9249                  | .9293   | .9271                 | .9315   | 1.000-14                                       |
| .9320  | .9366   | .9344                  | .9387   | .9365                 | .9408   | 1.000-16                                       |
| .9400  | .9440   | .9419                  | .9460   | .9439                 | .9480   | 1.000-18                                       |
| .9460  | .9498   | .9477                  | .9517   | .9497                 | .9537   | 1.000-20                                       |
| .9610  | .9645   | .9620                  | .9660   | .9636                 | .9676   | 1.000-28                                       |
| .9660  | .9691   | .9665                  | .9705   | .9679                 | .9719   | 1.000-32                                       |
| .9270  | .9347   | .9309                  | .9384   | .9347                 | .9422   | 1.0625-8                                       |
| .9720  | .9773   | .9748                  | .9798   | .9773                 | .9823   | 1.0625-12                                      |
| .9850  | .9896   | .9874                  | .9918   | .9896                 | .9940   | 1.0625-14                                      |
| .9950  | .9991   | .9965                  | 1.0012  | .9990                 | 1.0033  | 1.0625-16                                      |
| 1.0020   | 1.0065  | 1.0044                 | 1.0085  | 1.0064                | 1.0105  | 1.0625-18                                      |
| 1.0080   | 1.0123  | 1.0102                 | 1.0142  | 1.0122                | 1.0162  | 1.0625-20                                      |
| 1.0240   | 1.0270  | 1.0245                 | 1.0285  | 1.0261                | 1.0301  | 1.0625-28                                      |
| 0.9700   | 0.9790  | 0.9747                 | 0.9833  | 0.9789                | 0.9875  | 1.125-7  |
| .9900  | .9972   | .9934                  | 1.0009  | .9972                 | 1.0047  | 1.125-8  |
| 1.0350   | 1.0398  | 1.0373                 | 1.0423  | 1.0398                | 1.0448  | 1.125-12                                       |
| 1.0570   | 1.0616  | 1.0594                 | 1.0637  | 1.0615                | 1.0658  | 1.125-16                                       |
| 1.0650   | 1.0690  | 1.0669                 | 1.0710  | 1.0689                | 1.0730  | 1.125-18                                       |
| 1.0710   | 1.0748  | 1.0727                 | 1.0767  | 1.0747                | 1.0787  | 1.125-20                                       |
| 1.0860   | 1.0895  | 1.0870                 | 1.0910  | 1.0886                | 1.0926  | 1.125-28                                       |
| 1.0520   | 1.0597  | 1.0559                 | 1.0634  | 1.0597                | 1.0672  | 1.1875-8                                       |
| 1.0970   | 1.1023  | 1.0998                 | 1.1048  | 1.1023                | 1.1073  | 1.1875-12                                      |
| 1.1200   | 1.1241  | 1.1219                 | 1.1262  | 1.1240                | 1.1283  | 1.1875-16                                      |
| 1.1270   | 1.1315  | 1.1294                 | 1.1335  | 1.1314                | 1.1355  | 1.1875-18                                      |
| 1.1330   | 1.1373  | 1.1352                 | 1.1392  | 1.1372                | 1.1412  | 1.1875-20                                      |
| 1.1490   | 1.1520  | 1.1495                 | 1.1535  | 1.1511                | 1.1551  | 1.1875-28                                      |
| 1.0950   | 1.1040  | 1.0997                 | 1.1083  | 1.1039                | 1.1125  | 1.250-7  |
| 1.1150   | 1.1222  | 1.1184                 | 1.1259  | 1.1222                | 1.1297  | 1.250-8  |
| 1.1600   | 1.1648  | 1.1623                 | 1.1673  | 1.1648                | 1.1698  | 1.250-12                                       |
| 1.1820   | 1.1866  | 1.1844                 | 1.1887  | 1.1865                | 1.1908  | 1.250-16                                       |
| 1.1900   | 1.1940  | 1.1919                 | 1.1960  | 1.1939                | 1.1980  | 1.250-18                                       |
| 1.1960   | 1.1998  | 1.1977                 | 1.2017  | 1.1997                | 1.2037  | 1.250-20                                       |
| 1.2110   | 1.2145  | 1.2120                 | 1.2160  | 1.2136                | 1.2176  | 1.250-28                                       |
| 1.1770   | 1.1847  | 1.1809                 | 1.1884  | 1.1847                | 1.1922  | 1.3125-8                                       |
| 1.2220   | 1.2273  | 1.2248                 | 1.2298  | 1.2273                | 1.2323  | 1.3125-12                                      |
| 1.2450   | 1.2491  | 1.2469                 | 1.2512  | 1.2490                | 1.2533  | 1.3125-16                                      |
| 1.2520   | 1.2565  | 1.2544                 | 1.2585  | 1.2564                | 1.2605  | 1.3125-18                                      |
| 1.2580   | 1.2623  | 1.2602                 | 1.2642  | 1.2622                | 1.2662  | 1.3125-20                                      |
| 1.2740   | 1.2770  | 1.2745                 | 1.2785  | 1.2761                | 1.2801  | 1.3125-28                                      |
| 1.1950   | 1.2046  | 1.1996                 | 1.2096  | 1.2046                | 1.2146  | 1.375-6  |
| 1.2400   | 1.2472  | 1.2434                 | 1.2509  | 1.2472                | 1.2547  | 1.375-8  |
| 1.2850   | 1.2898  | 1.2873                 | 1.2923  | 1.2898                | 1.2948  | 1.375-12                                       |
| 1.3070   | 1.3116  | 1.3094                 | 1.3137  | 1.3115                | 1.3158  | 1.375-16                                       |
| 1.3150   | 1.3190  | 1.3169                 | 1.3210  | 1.3189                | 1.3230  | 1.375-18                                       |
| 1.3210   | 1.3248  | 1.3227                 | 1.3267  | 1.3247                | 1.3287  | 1.375-20                                       |
| 1.3360   | 1.3395  | 1.3370                 | 1.3410  | 1.3386                | 1.3426  | 1.375-28                                       |
| 1.2570   | 1.2671  | 1.2621                 | 1.2721  | 1.2671                | 1.2771  | 1.4375-6                                       |
| 1.3020   | 1.3097  | 1.3059                 | 1.3134  | 1.3097                | 1.3172  | 1.4375-8                                       |
| 1.3470   | 1.3523  | 1.3498                 | 1.3548  | 1.3523                | 1.3573  | 1.4375-12                                      |
| 1.3700   | 1.3741  | 1.3719                 | 1.3762  | 1.3740                | 1.3783  | 1.4375-16                                      |
| 1.3770   | 1.3815  | 1.3794                 | 1.3835  | 1.3814                | 1.3855  | 1.4375-18                                      |
| 1.3830   | 1.3873  | 1.3852                 | 1.3892  | 1.3872                | 1.3912  | 1.4375-20                                      |
| 1.3990   | 1.4020  | 1.3995                 | 1.4035  | 1.4011                | 1.4051  | 1.4375-28                                      |

See footnotes at end of table.

## FED-STD-H28/2B

TABLE II.A.4 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, class 3B (see 30.1) 1/ - continued

| Nominal size in inches<br>and threads per inch | Series<br>designation | Minor diameter of internal threads |                                       |                       |                                       |
|--|-----------------------|------------------------------------|---------------------------------------|-----------------------|---------------------------------------|
|  |                       | Minimum                            | Percent <sup>2/</sup><br>of<br>Thread | Maximum <sup>3/</sup> | Percent <sup>2/</sup><br>of<br>Thread |
| 1  | 2                     | 3                                  | 4                                     | 5                     | 6                                     |
|  |                       | in                                 |                                       | in                    |                                       |
| 1.500-6  | UNC                   | 1.3200                             | 83.1                                  | 1.3396                | 74.1                                  |
| 1.500-8  | 8UN                   | 1.3650                             | 83.1                                  | 1.3797                | 74.1                                  |
| 1.500-12                                       | UNF                   | 1.4100                             | 83.1                                  | 1.4198                | 74.1                                  |
| 1.500-16                                       | 16UN                  | 1.4320                             | 83.8                                  | 1.4408                | 72.9                                  |
| 1.500-18                                       | UNEF                  | 1.4400                             | 83.1                                  | 1.4480                | 72.1                                  |
| 1.500-20                                       | 20UN                  | 1.4460                             | 83.1                                  | 1.4537                | 71.3                                  |
| 1.500-28                                       | 28UN                  | 1.4610                             | 84.1                                  | 1.4676                | 69.8                                  |
| 1.5625-6                                       | 6UN                   | 1.3820                             | 83.4                                  | 1.4021                | 74.1                                  |
| 1.5625-8                                       | 8UN                   | 1.4270                             | 83.4                                  | 1.4422                | 74.1                                  |
| 1.5625-12                                      | 12UN                  | 1.4720                             | 83.6                                  | 1.4823                | 74.1                                  |
| 1.5625-16                                      | 16UN                  | 1.4950                             | 83.1                                  | 1.5033                | 72.9                                  |
| 1.5625-18                                      | UNEF                  | 1.5020                             | 83.8                                  | 1.5105                | 72.1                                  |
| 1.5625-20                                      | 20UN                  | 1.5080                             | 83.9                                  | 1.5162                | 71.3                                  |
| 1.625-6  | 6UN                   | 1.4450                             | 83.1                                  | 1.4646                | 74.1                                  |
| 1.625-8  | 8UN                   | 1.4900                             | 83.1                                  | 1.5047                | 74.1                                  |
| 1.625-12                                       | 12UN                  | 1.5350                             | 83.1                                  | 1.5448                | 74.1                                  |
| 1.625-16                                       | 16UN                  | 1.5570                             | 83.8                                  | 1.5658                | 72.9                                  |
| 1.625-18                                       | UNEF                  | 1.5650                             | 83.1                                  | 1.5730                | 72.1                                  |
| 1.625-20                                       | 20UN                  | 1.5710                             | 83.1                                  | 1.5787                | 71.3                                  |
| 1.6875-6                                       | 6UN                   | 1.5070                             | 83.4                                  | 1.5271                | 74.1                                  |
| 1.6875-8                                       | 8UN                   | 1.5520                             | 83.4                                  | 1.5672                | 74.1                                  |
| 1.6875-12                                      | 12UN                  | 1.5970                             | 83.6                                  | 1.6073                | 74.1                                  |
| 1.6875-16                                      | 16UN                  | 1.6200                             | 83.1                                  | 1.6283                | 72.9                                  |
| 1.6875-18                                      | UNEF                  | 1.6270                             | 83.8                                  | 1.6355                | 72.1                                  |
| 1.6875-20                                      | 20UN                  | 1.6330                             | 83.9                                  | 1.6412                | 71.3                                  |
| 1.750-5  | UNC                   | 1.5340                             | 83.1                                  | 1.5575                | 74.1                                  |
| 1.750-6  | 6UN                   | 1.5700                             | 83.1                                  | 1.5896                | 74.1                                  |
| 1.750-8  | 8UN                   | 1.6150                             | 83.1                                  | 1.6297                | 74.1                                  |
| 1.750-12                                       | 12UN                  | 1.6600                             | 83.1                                  | 1.6698                | 74.1                                  |
| 1.750-16                                       | 16UN                  | 1.6820                             | 83.8                                  | 1.6908                | 72.9                                  |
| 1.750-20                                       | 20UN                  | 1.6960                             | 83.1                                  | 1.7037                | 71.3                                  |
| 1.8125-6                                       | 6UN                   | 1.6320                             | 83.4                                  | 1.6521                | 74.1                                  |
| 1.8125-8                                       | 8UN                   | 1.6770                             | 83.4                                  | 1.6922                | 74.1                                  |
| 1.8125-12                                      | 12UN                  | 1.7220                             | 83.6                                  | 1.7323                | 74.1                                  |
| 1.8125-16                                      | 16UN                  | 1.7450                             | 83.1                                  | 1.7533                | 72.9                                  |
| 1.8125-20                                      | 20UN                  | 1.7580                             | 83.9                                  | 1.7662                | 71.3                                  |
| 1.8125-6                                       | 6UN                   | 1.6950                             | 83.1                                  | 1.7146                | 74.1                                  |
| 1.8125-8                                       | 8UN                   | 1.7400                             | 83.1                                  | 1.7547                | 74.1                                  |
| 1.8125-12                                      | 12UN                  | 1.7850                             | 83.1                                  | 1.7948                | 74.1                                  |
| 1.8125-16                                      | 16UN                  | 1.8070                             | 83.8                                  | 1.8158                | 72.9                                  |
| 1.8125-20                                      | 20UN                  | 1.8210                             | 83.1                                  | 1.8287                | 71.3                                  |
| 1.9375-6                                       | 6UN                   | 1.7570                             | 83.4                                  | 1.7771                | 74.1                                  |
| 1.9375-8                                       | 8UN                   | 1.8020                             | 83.4                                  | 1.8172                | 74.1                                  |
| 1.9375-12                                      | 12UN                  | 1.8470                             | 83.6                                  | 1.8573                | 74.1                                  |
| 1.9375-16                                      | 16UN                  | 1.8700                             | 83.1                                  | 1.8783                | 72.9                                  |
| 1.9375-20                                      | 20UN                  | 1.8830                             | 83.9                                  | 1.8912                | 71.3                                  |
| 2.000-4.5                                      | UNC                   | 1.7590                             | 83.5                                  | 1.7861                | 74.1                                  |
| 2.000-6  | 6UN                   | 1.8200                             | 83.1                                  | 1.8396                | 74.1                                  |
| 2.000-8  | 8UN                   | 1.8650                             | 83.1                                  | 1.8797                | 74.1                                  |
| 2.000-12                                       | 12UN                  | 1.9100                             | 83.1                                  | 1.9198                | 74.1                                  |
| 2.000-16                                       | 16UN                  | 1.9320                             | 83.8                                  | 1.9408                | 72.9                                  |
| 2.000-20                                       | 20UN                  | 1.9460                             | 83.1                                  | 1.9537                | 71.3                                  |
| 2.0625-16                                      | UNS                   | 1.9950                             | 83.1                                  | 2.0033                | 72.9                                  |

See footnotes at end of table.

TABLE II.A.4 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, class 3B (see 30.1) 1/ - continued

| Recommended hole size limits for different lengths of engagement |         |                        |         |                       |         | Nominal size in inches<br>and threads per inch |
|--|---------|------------------------|---------|-----------------------|---------|--|
| To and including 0.33D   |         | Above 0.33D thru 0.67D |         | Above 0.67D thru 1.5D |         |  |
| Minimum  | Maximum | Minimum                | Maximum | Minimum               | Maximum |  |
| 7  | 8       | 9                      | 10      | 11                    | 12      | 1  |
| in   | in      | in                     | in      | in                    | in      |  |
| 1.3200   | 1.3296  | 1.3246                 | 1.3346  | 1.3296                | 1.3396  | 1.500-6  |
| 1.3650   | 1.3722  | 1.3684                 | 1.3759  | 1.3722                | 1.3797  | 1.500-8  |
| 1.4100   | 1.4148  | 1.4123                 | 1.4173  | 1.4148                | 1.4198  | 1.500-12                                       |
| 1.4320   | 1.4366  | 1.4344                 | 1.4387  | 1.4365                | 1.4408  | 1.500-16                                       |
| 1.4400   | 1.4440  | 1.4419                 | 1.4460  | 1.4439                | 1.4480  | 1.500-18                                       |
| 1.4460   | 1.4498  | 1.4477                 | 1.4517  | 1.4497                | 1.4537  | 1.500-20                                       |
| 1.4610   | 1.4645  | 1.4620                 | 1.4660  | 1.4636                | 1.4676  | 1.500-28                                       |
| 1.3820   | 1.3921  | 1.3871                 | 1.3971  | 1.3921                | 1.4021  | 1.5625-6                                       |
| 1.4270   | 1.4347  | 1.4309                 | 1.4384  | 1.4347                | 1.4422  | 1.5625-8                                       |
| 1.4720   | 1.4773  | 1.4748                 | 1.4798  | 1.4773                | 1.4823  | 1.5625-12                                      |
| 1.4950   | 1.4991  | 1.4969                 | 1.5012  | 1.4990                | 1.5033  | 1.5625-16                                      |
| 1.5020   | 1.5065  | 1.5044                 | 1.5085  | 1.5064                | 1.5105  | 1.5625-18                                      |
| 1.5080   | 1.5123  | 1.5102                 | 1.5142  | 1.5122                | 1.5162  | 1.5625-20                                      |
| 1.4450   | 1.4546  | 1.4496                 | 1.4596  | 1.4546                | 1.4646  | 1.625-6  |
| 1.4900   | 1.4972  | 1.4934                 | 1.5009  | 1.4972                | 1.5047  | 1.625-8  |
| 1.5350   | 1.5398  | 1.5373                 | 1.5423  | 1.5398                | 1.5448  | 1.625-12                                       |
| 1.5570   | 1.5616  | 1.5594                 | 1.5637  | 1.5615                | 1.5658  | 1.625-16                                       |
| 1.5650   | 1.5690  | 1.5669                 | 1.5710  | 1.5689                | 1.5730  | 1.625-18                                       |
| 1.5710   | 1.5748  | 1.5727                 | 1.5767  | 1.5747                | 1.5787  | 1.625-20                                       |
| 1.5070   | 1.5171  | 1.5121                 | 1.5221  | 1.5171                | 1.5271  | 1.6875-6                                       |
| 1.5520   | 1.5597  | 1.5559                 | 1.5634  | 1.5597                | 1.5672  | 1.6875-8                                       |
| 1.5970   | 1.6023  | 1.5998                 | 1.6048  | 1.6023                | 1.6073  | 1.6875-12                                      |
| 1.6200   | 1.6241  | 1.6219                 | 1.6262  | 1.6240                | 1.6283  | 1.6875-16                                      |
| 1.6270   | 1.6315  | 1.6294                 | 1.6335  | 1.6314                | 1.6355  | 1.6875-18                                      |
| 1.6330   | 1.6373  | 1.6352                 | 1.6392  | 1.6372                | 1.6412  | 1.6875-20                                      |
| 1.5340   | 1.5455  | 1.5395                 | 1.5515  | 1.5455                | 1.5575  | 1.750-5  |
| 1.5700   | 1.5796  | 1.5746                 | 1.5846  | 1.5796                | 1.5896  | 1.750-6  |
| 1.6150   | 1.6222  | 1.6184                 | 1.6259  | 1.6222                | 1.6297  | 1.750-8  |
| 1.6600   | 1.6648  | 1.6623                 | 1.6673  | 1.6648                | 1.6698  | 1.750-12                                       |
| 1.6820   | 1.6866  | 1.6844                 | 1.6887  | 1.6865                | 1.6908  | 1.750-16                                       |
| 1.6960   | 1.6998  | 1.6977                 | 1.7017  | 1.6997                | 1.7037  | 1.750-20                                       |
| 1.6320   | 1.6421  | 1.6371                 | 1.6471  | 1.6421                | 1.6521  | 1.8125-6                                       |
| 1.6770   | 1.6847  | 1.6809                 | 1.6884  | 1.6847                | 1.6922  | 1.8125-8                                       |
| 1.7220   | 1.7273  | 1.7248                 | 1.7298  | 1.7273                | 1.7323  | 1.8125-12                                      |
| 1.7450   | 1.7491  | 1.7469                 | 1.7512  | 1.7490                | 1.7533  | 1.8125-16                                      |
| 1.7580   | 1.7623  | 1.7602                 | 1.7642  | 1.7622                | 1.7662  | 1.8125-20                                      |
| 1.6950   | 1.7046  | 1.6996                 | 1.7096  | 1.7046                | 1.7146  | 1.875-6  |
| 1.7400   | 1.7472  | 1.7434                 | 1.7509  | 1.7472                | 1.7547  | 1.875-8  |
| 1.7850   | 1.7898  | 1.7873                 | 1.7923  | 1.7898                | 1.7948  | 1.875-12                                       |
| 1.8070   | 1.8116  | 1.8094                 | 1.8137  | 1.8115                | 1.8158  | 1.875-16                                       |
| 1.8210   | 1.8248  | 1.8227                 | 1.8267  | 1.8247                | 1.8287  | 1.875-20                                       |
| 1.7570   | 1.7671  | 1.7621                 | 1.7721  | 1.7671                | 1.7771  | 1.9375-6                                       |
| 1.8020   | 1.8097  | 1.8059                 | 1.8134  | 1.8097                | 1.8172  | 1.9375-8                                       |
| 1.8470   | 1.8523  | 1.8498                 | 1.8548  | 1.8523                | 1.8573  | 1.9375-12                                      |
| 1.8700   | 1.8741  | 1.8719                 | 1.8762  | 1.8740                | 1.8783  | 1.9375-16                                      |
| 1.8830   | 1.8873  | 1.8852                 | 1.8892  | 1.8872                | 1.8912  | 1.9375-20                                      |
| 1.7590   | 1.7727  | 1.7661                 | 1.7794  | 1.7728                | 1.7861  | 2.000-4.5                                      |
| 1.8200   | 1.8296  | 1.8246                 | 1.8346  | 1.8296                | 1.8396  | 2.000-6  |
| 1.8650   | 1.8722  | 1.8684                 | 1.8759  | 1.8722                | 1.8797  | 2.000-8  |
| 1.9100   | 1.9148  | 1.9123                 | 1.9173  | 1.9148                | 1.9198  | 2.000-12                                       |
| 1.9320   | 1.9366  | 1.9344                 | 1.9387  | 1.9365                | 1.9408  | 2.000-16                                       |
| 1.9460   | 1.9498  | 1.9477                 | 1.9517  | 1.9497                | 1.9537  | 2.000-20                                       |
| 1.9950   | 1.9991  | 1.9969                 | 2.0012  | 1.9990                | 2.0033  | 2.0625-16                                      |

See footnotes at end of table.

## FED-STD-H28/2B

TABLE II.A.4 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, class 3B (see 30.1) 1/ - continued

| Nominal size in inches<br>and threads per inch | Series<br>designation | Minor diameter of internal threads |                                       |                       |                                       |
|--|-----------------------|------------------------------------|---------------------------------------|-----------------------|---------------------------------------|
|  |                       | Minimum                            | Percent <sup>2/</sup><br>of<br>Thread | Maximum <sup>3/</sup> | Percent <sup>2/</sup><br>of<br>Thread |
| 1  | 2                     | 3                                  | 4                                     | 5                     | 6                                     |
|  |                       | in                                 |                                       | in                    |                                       |
| 2.125-6  | 6UN                   | 1.9450                             | 83.1                                  | 1.9646                | 74.1                                  |
| 2.125-8  | 8UN                   | 1.9900                             | 83.1                                  | 2.0047                | 74.1                                  |
| 2.125-12                                       | 12UN                  | 2.0350                             | 83.1                                  | 2.0448                | 74.1                                  |
| 2.125-16                                       | 16UN                  | 2.0570                             | 83.8                                  | 2.0658                | 72.9                                  |
| 2.125-20                                       | 20UN                  | 2.0710                             | 83.1                                  | 2.0787                | 71.3                                  |
| 2.1875-16                                      | UNS                   | 2.1200                             | 83.1                                  | 2.1283                | 72.9                                  |
| 2.250-4.5                                      | UNC                   | 2.0090                             | 83.5                                  | 2.0361                | 74.1                                  |
| 2.250-6  | 6UN                   | 2.0700                             | 83.1                                  | 2.0896                | 74.1                                  |
| 2.500-4  | UNC                   | 2.2290                             | 83.4                                  | 2.2594                | 74.1                                  |
| 2.750-4  | UNC                   | 2.4790                             | 83.4                                  | 2.5094                | 74.1                                  |
| 3.000-4  | UNC                   | 2.7290                             | 83.4                                  | 2.7594                | 74.1                                  |
| 3.250-4  | UNC                   | 2.9790                             | 83.4                                  | 3.0094                | 74.1                                  |

See footnotes at end of table.

TABLE II.A.4 - Recommended hole size limits before threading for different lengths of engagement, standard Unified and some UNS threads, class 3B (see 30.1) 1/ - continued

| Recommended hole size limits for different lengths of engagement |         |                        |         |                       |         | Nominal size in inches and threads per inch |
|--|---------|------------------------|---------|-----------------------|---------|---|
| To and including 0.33D   |         | Above 0.33D thru 0.67D |         | Above 0.67D thru 1.5D |         |   |
| Minimum  | Maximum | Minimum                | Maximum | Minimum               | Maximum |   |
| 7  | 8       | 9                      | 10      | 11                    | 12      | 1   |
| in   | in      | in                     | in      | in                    | in      |   |
| 1.9450   | 1.9546  | 1.9496                 | 1.9596  | 1.9546                | 1.9646  | 2.125-6                                     |
| 1.9900   | 1.9972  | 1.9934                 | 2.0009  | 1.9972                | 2.0047  | 2.125-8                                     |
| 2.0350   | 2.0398  | 2.0373                 | 2.0423  | 2.0398                | 2.0448  | 2.125-12                                    |
| 2.0570   | 2.0616  | 2.0594                 | 2.0637  | 2.0615                | 2.0658  | 2.125-16                                    |
| 2.0710   | 2.0748  | 2.0727                 | 2.0767  | 2.0747                | 2.0787  | 2.125-20                                    |
| 2.1200   | 2.1241  | 2.1219                 | 2.1262  | 2.1240                | 2.1283  | 2.1875-16                                   |
| 2.0090   | 2.0227  | 2.0161                 | 2.0294  | 2.0228                | 2.0361  | 2.250-4.5                                   |
| 2.0700   | 2.0796  | 2.0746                 | 2.0846  | 2.0796                | 2.0896  | 2.250-6                                     |
| 2.2290   | 2.2444  | 2.2369                 | 2.2519  | 2.2444                | 2.2594  | 2.500-4                                     |
| 2.4790   | 2.4944  | 2.4869                 | 2.5019  | 2.4944                | 2.5094  | 2.750-4                                     |
| 2.7290   | 2.7444  | 2.7369                 | 2.7519  | 2.7444                | 2.7594  | 3.000-4                                     |
| 2.9790   | 2.9944  | 2.9869                 | 3.0019  | 2.9944                | 3.0094  | 3.250-4                                     |

1/ The differences between limits are equal to the minor diameter tolerances for lengths of engagement to and including 0.33D. However, the minimum values for lengths of engagement greater than 0.33D in sizes 0.25 in. and larger are adjusted so that the difference between limits is never less than 0.0040 in. For diameter-pitch combinations other than those given in this table, see 30.2.

Hole size limits for diameter-pitch combinations which do not appear in this table may be obtained by use of values in this table provided there is a diameter-pitch combination in the table:

- (1) with the same pitch and
- (2) with a diameter that is less by an integral amount than the diameter of the diameter-pitch combination for which hole size values are desired. (NOTE: Values in the table for nominal sizes less than 1.00 in. cannot be used for this purpose.)

EXAMPLE: To obtain the values for the 4.000-8UN-3B thread, add 2.000 to values for the 2.000-8UN thread shown in the table. These values would then become: 3.8650, 3.8722, 3.8684, 3.8759, 3.8722, 3.8797. The percentages of thread will remain unchanged.

2/ Based on values as rounded off in the preceding column. 100 percent of thread = 0.75H (see 20.2.3).

3/ Based on length of engagement equal to the nominal diameter.

## APPENDIX B

## DESIGN OF UNIFIED SCREW THREADS

40. Scope. This appendix provides guidelines which may be used in the design of unified screw threads for threaded parts. It is not a mandatory part of the standard. The information contained herein is intended for guidance only. It supplements information contained in Appendix B of ASME B1.1-1989.

50. General.

50.1 Introduction. In general, any given problem in thread design may be susceptible to several more or less satisfactory solutions based on the preliminary selection of certain elements of the design and the proper adjustment of the other elements. In other words, thread design is to a large extent empirical and is partially based on previous experience with similar designs and the judgment of the designer. Accordingly, it is not practicable to present a definite system of approach to the design of a threaded assembly but merely to present a discussion of various design factors.

50.2 Factor relationships. The interrelation of length of engagement, minimum major diameter of the external thread, maximum minor diameter of the internal thread, and the strength of the assembled thread needs to be understood and carefully considered in order to produce the optimum design of a special thread. It is not economical to use either a length of thread engagement which is longer than required or shorter than that which will develop the full strength of the externally threaded member. Other factors, such as control of tap breakage, proper seating of a threaded part on a shoulder, the prevention of cross threading, conditions of loading when the assembled parts are not concentric, and possible collapse of a hollow externally threaded member, require careful analysis and adjustment of the design with respect to selection of the diameter-pitch combination, the class of thread, length of engagement, and major and minor diameter tolerances.

50.3 Thread fit considerations. A close fitting thread assembly under some conditions may fail, whereas the cause of failure may be eliminated by providing a looser fit. A cap screw that seats only on one side of the bearing surface under the head may break off when the screw is tightened. When a screw has a large bearing surface under the head or when the head must be square with a projecting pin, sufficient pitch diameter clearance must be provided to allow for any out-of-squareness of the screw axis with the bearing surface under the head. Thus, as large a pitch diameter tolerance as possible, together with providing proper tolerances on squareness of face with the thread axis where seating is required, may avoid the necessity for specifying a heat treated bolt.



50.4 Standard threads. Use of standard threads is required in accordance with 4.f. Information on preferred sizes and classes for special threads appears in 5.1 and 5.2. Whenever practicable, lengths of engagement for coarse, fine, 4, 6 and 8 thread series should be between 5 pitches and 1 1/2 diameters; for all other series they should be between 5 and 15 pitches. Application of these principles will help keep costs of manufacture and gaging to a minimum.

60. Eccentricity of assembly and cross threading.

Note: Table 6 of ASME B1.1-1989 includes tables of 0.375H, 0.75H and H.

In assembly and use, the combined tolerances and allowances on both mating parts should not allow threads to disengage on one side when assembly is eccentric. The axis of the internal thread can be displaced radially from coincidence with the axis of the external thread by an amount equal to the sum of the pitch diameter tolerances and the allowance. This radial displacement may be sufficient so that the flank contact is entirely on one side and on the opposite side the crest of the external thread will be in line with the crest of the internal thread with the following results when the screw is constrained in such a position in a tapped hole: (1) There will be danger of crossing the threads in starting, and (2) the screw may pull out of the hole when tension is exerted in this constrained position. The minimum amount of overlap is arbitrary and controversial, but the following general rule can be used in lieu of more specific data:

As the first step to assure the minimum safe overlap on both sides when the assembly is concentric, the difference between the minimum major diameter of the external thread and the maximum minor diameter of the internal thread should not be less than twice the addendum of the external thread (0.75H). Otherwise stated, the sum of the major-diameter tolerance and allowance, if any, of the external thread and the minor-diameter tolerance of the internal thread should not be greater than 4/3 the addendum of the external thread, 0.5H. This provides for a minimum of 50 percent thread engagement. As the second step, to assure that minimum safe overlap on one side when the assembly is eccentric, the difference between the maximum pitch diameter of the internal thread and the minimum pitch diameter of the external thread should not be greater than the basic thread height (0.625H). Otherwise stated, the sum of the pitch-diameter tolerances of both threads and the allowance, if any, should not be greater than the basic thread height (0.625H). This provides for an eccentric assembly condition equal to half the basic thread height (0.3125H) and zero minimum overlap on one side. If the results from the limits of size selected violate the above rules, the tolerances should be reduced by using a closer class of tolerance, assuming tolerances consistent with manufacturing possibility, or a coarser pitch should be used to increase the amount of overlap. The major-diameter tolerance of the external thread or minor-diameter tolerance of the internal thread should not be less than the pitch-diameter tolerance of the respective thread to maintain thread form. Also, it should be noted that, if the tolerance on the minor diameter of the internal thread must necessarily be large, the major diameter of the external thread must be held close to the maximum major diameter and vice versa.

FED-STD-H28/2B

## 70. Strength factors.

70.1 Tensile stress area. Tests have shown that externally threaded parts fail in tension at loads corresponding to those of unthreaded parts with diameters midway between their pitch and minor diameters. Formulas (1a) and (1b) in table II.B.1 provide stress area based upon a diameter approximately midway between minimum pitch diameter and minimum minor diameter. These formulas have been applied successfully to steel and other metals with ultimate strengths up to 180,000 psi and are often used for product acceptance. Tensile stress areas for standard sizes are tabulated in section 11 of ASME B1.1-1989.

70.2 Shear areas at minimum material. The geometric shear area of an internal thread at minimum material is equal to the area of that thread which is intersected by a cylinder with a diameter equal to the minimum major diameter of the mating external thread over the length of engagement. This is identified in figure 2.B.1 for a one pitch section and formulas (2a) and (2b) in table II.B.1 are used for calculation. Similarly, the geometric shear area of an external thread at minimum material is equal to the area of that thread which is intersected by a cylinder with a diameter equal to the maximum minor diameter of the mating internal thread. This is also identified in figure 2.B.1 for a one pitch section and formulas (4a) and (4b) in table II.B.1 are used for calculation.

TABLE II.B.1 Formulas for screw thread strength factors

| Formula number | Characteristic  | Formula   | Reference paragraph |
|----------------|---|---|---------------------|
| (1a)           | Tensile Stress Area   | $A_b = 3.1416 \left( \frac{d_2 \text{ bsc } 3H}{2} - \frac{3H}{16} \right)^2$   | 70.1                |
| (1b)           |   | $A_b = 0.7854 \left( d_{\text{bsc}} - \frac{0.9743}{n} \right)^2$   | 70.1                |
| (2a)           | Shear area, internal threads<br>(Min material ext and int threads)                        | $AS_{n \text{ min}} = 3.1416 n LE d_{\text{min}} \left[ \frac{1}{2n} + 0.57735 (d_{\text{min}} - D_{2 \text{ max}}) \right]$              | 70.2                |
| (2b)           |   | $AS_{n \text{ min}} = 3.1416 d_{\text{min}} \left[ 0.875 - 0.57735n (TD + TD_2 + es) \right] LE$  | 70.2                |
| (3)            | Shear area, internal threads<br>(Simplified; for $d$ equal to or greater than 0.250 inch) | $AS_n = 3.1416 D_2 \text{ bsc } \frac{3}{4} LE$   | 70.4                |
| (4a)           | Shear area, external threads<br>(Min material ext and int threads)                        | $AS_{g \text{ min}} = 3.1416 n LE D_{1 \text{ max}} \left[ \frac{1}{2n} + 0.57735 (d_{2 \text{ min}} - D_{1 \text{ max}}) \right]$        | 70.2                |
| (4b)           |   | $AS_{g \text{ min}} = 3.1416 D_{1 \text{ max}} \left[ 0.75 - 0.57735 n (TD_1 + TD_2 + es) \right] LE$                                     | 70.2                |
| (5)            | Shear area, external threads<br>(Simplified)  | $AS_g = 3.1416 d_2 \text{ bsc } \frac{3}{8} LE$   | 70.4                |
| (6a)           | Shear area, external threads<br>(Basic size ext and int threads)                          | $AS_{g \text{ max}} = 3.1416 D_1 \text{ bsc } \frac{3}{4} \left( \frac{LE}{d_{\text{bsc}}} \text{ from Fig 2.B.2} \right) d_{\text{bsc}}$ | 70.3                |
| (6b)           |   | $AS_{g \text{ max}} = 3.1416 D_1 \text{ bsc } \frac{3}{4} LE$   | 70.3                |
| (7)            | Shear area, combined failure  | $AS = 3.1416 D_2 \text{ bsc } \frac{LE}{2}$   | 70.5                |
| (8)            | Shear stress area ratio   | $R_1 = \frac{\text{Formula (6a) or (6b)}}{\text{Formula (2a) or (2b)}}$   | 70.7.5              |
| (9)            | Material strength ratio   | $R_2 = \frac{UTS_n}{UTS_g}$   | 70.7.5              |

Notation:  $d$  = major diameter, external thread (was  $D_g$ )

$d_2$  = pitch diameter, external thread (was  $E_g$ )

$D_1$  = minor diameter, internal thread (was  $R_n$ )

$D_2$  = pitch diameter, internal thread (was  $E_n$ )

$es$  = allowance, external thread (was  $G$ )

$LE$  = length of thread engagement (was  $L_e$ )

$n$  = number of threads per inch

$UTS_n$  = ultimate tensile strength of internally threaded part

$UTS_g$  = ultimate tensile strength of externally threaded part

$TD, TD_2, TD_1, TD_2$  = tolerance on  $d, d_2, D_1, D_2$ , respectively

$\frac{3H}{16}, 0.1875H$  = half external thread addendum (tabulated in Table 6 of ASME B1.1-1989)

bsc, max, min = modifiers denoting basic, maximum and minimum values, respectively

TABLE II.B.2 Formulas for screw thread design

| Formula number | Characteristic  | Formula   | Reference paragraph |
|----------------|---|---|---------------------|
| (11)           | Tensile stress, externally threaded part - pure tension   | $S_t = \frac{F}{A_s^* \text{ from (1a) or (1b)}}$   | 70.6                |
| (12)           | Combined tensile stress, externally threaded part   | $S_t' = S_s' + \frac{S_t}{2}$ <p>with <math>S_t = \frac{F}{0.7854 \left[ (d_{1\text{min}})^2 - d_h^2 \right]}</math></p> $S_s' = \sqrt{\left( \frac{S_t}{2} \right)^2 + (S_s)^2}$ $S_s = \frac{T d_{1\text{min}}}{0.1963 \left[ (d_{1\text{min}})^4 - d_b^4 \right]}$ | 70.6                |
| (13)           | Length of engagement based upon combined shear failure of external and internal threads   | $LE = \frac{4A_s^* \text{ from (1a) or (1b)}}{3.1416 d_{2\text{bec}}}$  | 70.7.3              |
| (14)           | Length of engagement based upon shear of external thread  | $LE = \frac{2A_s^* \text{ from (1a) or (1b)}}{AS_s \text{ from (4a) or (4b)}}$ $\dagger LE$   | 70.7.4              |
| (15)           | Length of engagement based upon developing full tensile strength of external thread with threads at basic size - used with (16) | $LE = \frac{2A_s^* \text{ from (1a) or (1b)}}{AS_s \text{ from (6b)}}$ $\dagger LE$   | 70.7.5              |
| (16)           | Length of engagement based upon shear of internal thread<br>$\left( \frac{R_1}{R_2} \text{ is greater than } 1 \right)$         | $LE = LE \text{ from (15)} \times \frac{R_1 \text{ from (8)}}{R_2 \text{ from (9)}}$  | 70.7.5              |

Notes: 1. Where  $A_s^*$  is indicated, subtract  $0.7854d_h^2$  from  $A_s$  for a hollow part.

2. Numbers in parenthesis are formula numbers from Table II and from this table.

Notation:  $d_{1\text{min}}$  = minimum minor diameter, external thread, flat form (was  $K_{\text{min}}$ ), inch.

In formula (12),  $d_{1\text{min}} = d_{2\text{bec}} - \frac{3}{4}B = d_{\text{bec}} - \frac{1.2990}{n}$

$d_h$  = hole diameter, externally threaded part, inch. If there is no hole,  $d_h = 0$

$F$  = axial load on externally threaded part, lb

$S_s$  = shear stress, psi

$S_t'$  = combined shear stress, psi

$T$  = transmitted wrench torque in threaded section (approximately half of the applied wrench torque), in.-lb.

† LE = in formulas (14) and (15) no value of LE is required on the right-hand sides of the formulas since  $AS_s$  is given in terms of LE.

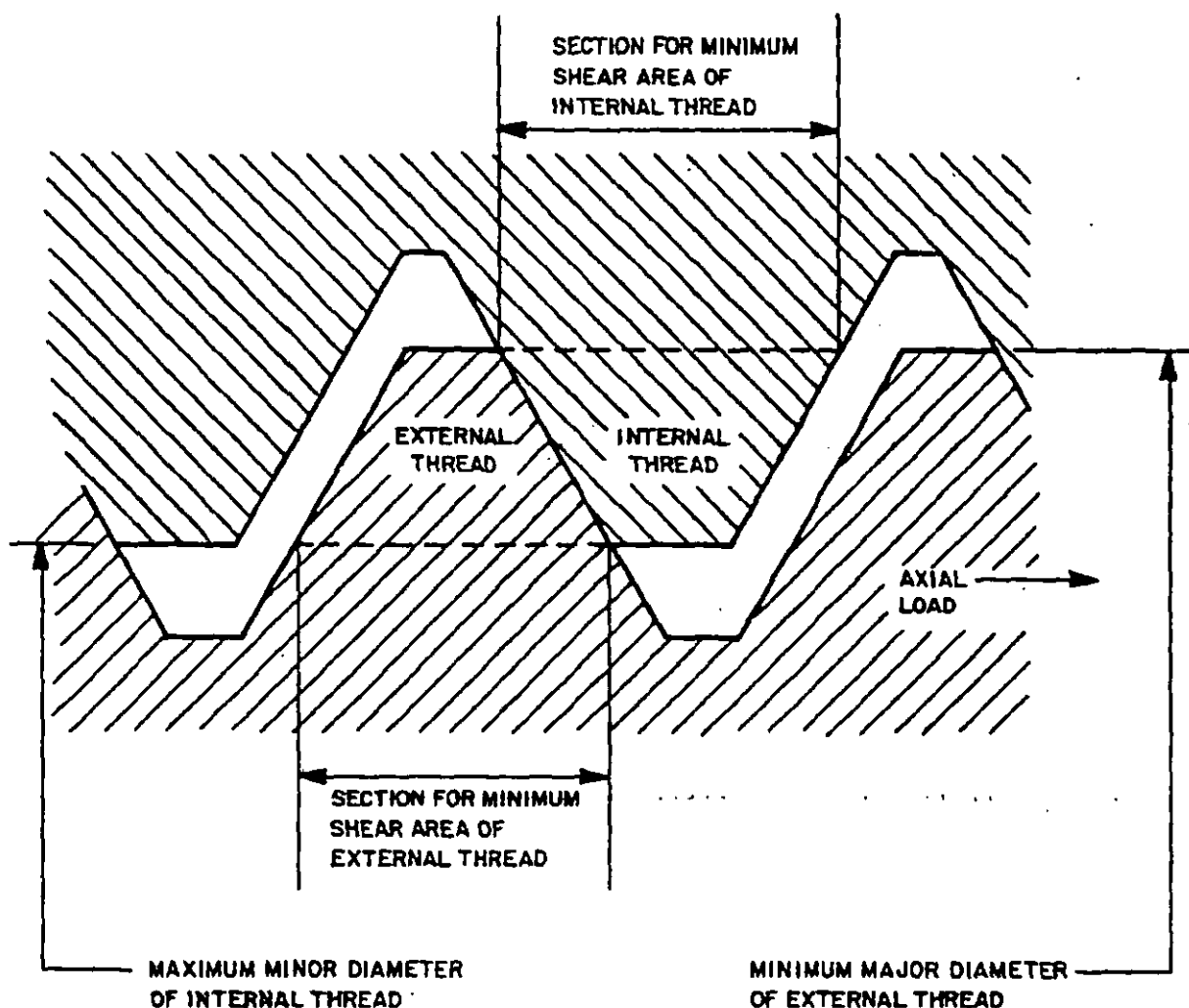


FIGURE 2.B.1 SHEAR AREAS AT MINIMUM MATERIAL

70.3 Shear areas at basic size. The geometric shear area of an external thread at basic size is equal to the area of a basic size thread which is intersected by a cylinder with a diameter equal to the basic minor diameter. Formulas (6a) and (6b) of table II.B.1 are used for calculation. The geometric shear area of an internal thread at basic size is not ordinarily used for calculations.

70.4 Shear area simplified formulas. Formulas (3) and (5) in table II.B.1 are simplified formulas for internal and external thread shear areas. They are based upon empirical data and give shear areas which vary from the geometric minimum material shear areas. In some cases, test data agrees more closely with these simplified formula shear areas than with geometric shear areas.

FED-STD-H28/2B

70.5 Shear area, combined failure of external and internal threads. When the mating external and internal threads are on parts manufactured from materials of approximately equal strength, failure will usually take place in both threads simultaneously. Thread bending during failure changes the thread geometry in this case so that effective shear area is significantly smaller than those calculated from formulas discussed in 70.2, 70.3 and 70.4 above. Formula (7) in table II.B.1 is an empirical formula which gives an approximate equivalent for this case. Numerically, it describes a failure at the pitch diameter of one of the threads.

70.6 Tensile stress. Formula (11) in table II.B.2 is often used for acceptance of externally threaded fasteners with ultimate tensile strength, yield strength, or some other selected stress level applied to  $S_t$  in order to determine the required axial test load. When threads are used in a joint, a tightening torque is applied to overcome friction under a bolt head or nut, to overcome thread friction, and to develop the axial load. This torque results in a shear stress, which when combined with the tensile stress from the axial load, causes an increase in the effective tensile stress. Formula (12) in table II.B.2 describes this situation. Experience has shown that for a solid externally threaded part, the combined stress is generally about 20% greater than the tensile stress calculated from formula (11). Therefore, in this case, the combined stress is often assumed to be  $1.2S_t$  or is not considered due to satisfactory experience with the Factor of Safety used.

#### 70.7 Length of engagement, LE.

70.7.1 If failure of a fastening system using standard threaded fasteners should occur it is generally more economical that the externally threaded part will break rather than that either the external or internal thread will strip. In other words, the length of thread engagement should be sufficient to develop the full strength of the screw. Thus, the length of internal thread and the dimensions of this thread, particularly its minor diameter, should be such that, taking into account a possible difference in strength of material of the internal and external threads, the threaded portion of the externally threaded part will break before either the external or internal threads strip. Due to this situation, lengths of engagement formulas are derived from shear formulas with tensile stress area  $A_s$  replaced by  $2A_s$  because the required area in shear is twice the tensile stress area in order to develop the full strength of the externally threaded part. This relationship is based upon experiments made by the National Bureau of Standards in 1929, in which it was found that for hot-rolled and cold-rolled steel, and brass screws and nuts, this factor varied from 1.7 to 2.0. The effect of combined stress is not taken into account in calculation of LE because the added shear load affects both tensile and shear stresses in approximately the same proportion.

70.7.2 All formulas for length of engagement, given in table II.B.2 yield approximate values since they are based in part upon shear areas which are not exact due to nut dilation which varies with geometry, friction forces, and material properties. Also, the effectiveness of partial threads, in the countersinks (or chamfers) on the ends of the internal thread, is not always the same. For calculations, approximately half the countersink depth may be considered in the length of engagement. It is advisable that calculations of length of engagement and corresponding load capabilities of a threaded joint be checked by actual tests, for critical joints.

70.7.3 When the externally and internally threaded parts are made from materials of approximately the same strength, required length of engagement in formula (13) of table II.B.2 may be applied. This assumes a combination failure of both threads (see 70.5).

70.7.4 When the strength of the internal thread materially exceeds that of the external thread, required length of engagement in formula (14) of table II.B.2 may be applied. This assumes shear of the external thread and uses the geometric shear area of the minimum external thread (see 70.2). A slightly longer or shorter length of engagement will be indicated if the simplified formula (5) in table II.B.1 is used.

70.7.5 When the strength of the external thread materially exceeds that of the internal thread, required length of engagement in formula (16) of table II.B.2 is used. This is based upon the internal thread stripping load being equal to the nominal external thread stripping load which will develop full strength of the externally threaded part. If  $R_1/R_2$  is less than 1, see 70.7.4 and if approximately equal to 1, see 70.7.3.

70.7.6 For an adjusting or lead screw or if the connection will be frequently unscrewed, the calculated LE should be increased to allow for the expected wear on the flanks of the threads during the useful life of the components.

70.7.7 For tapped holes in sheet metal, the maximum size of the screw to be specified should be such that the thickness of sheet equals the LE required to develop full strength. In order to use the largest possible screw, it is necessary that the tolerance,  $TD_1$ , on the minor diameter of the hole should be the practical minimum. If it should prove to be impracticable to reduce the minor diameter tolerance to such a value, it may be necessary to decrease the minimum minor diameter of the internal thread and to increase the minor diameter tolerance by the same amount. If this is done, the maximum minor diameter of the screw must be reduced by the same amount to prevent interference and the minor diameter of the GO thread ring gage must likewise be decreased, as this is the only control of the minor diameter of the screw. In all such cases, where dimensions are altered from those calculated according to the standard, the threads should be designated as specified in section 6.7 of ASME B1.1-1989.

## FED-STD-H28/2B

70.7.8 For retaining collars on shafts where the expected axial force resisted by the collar is appreciably less than the tensile force that the shaft itself is capable of resisting, LE need only be long enough to withstand the expected axial force on the collar. If  $F_c$  is the axial force to be carried by the collar,  $UTS_s$  is the tensile strength of the shaft and  $UTS_n$  is the tensile strength of the collar, calculate the required length of engagement from one of the following formulas:

$$a. \text{ Collar thread strip: } LE = \frac{2F_c}{\frac{UTS_n \times AS_n \text{ from (2a), (2b) or (3)}}{LE}}$$

$$b. \text{ Shaft thread strip: } LE = \frac{2F_c}{\frac{UTS_s \times AS_s \text{ from (4a), (4b) or (5)}}{LE}}$$

c. Combination thread stripping when  $UTS_s = UTS_n$  approximately:

$$LE = \frac{2F_c}{\frac{UTS_s \text{ or } UTS_n \times AS \text{ from (7)}}{LE}}$$

Note: Numbers in parenthesis are formula numbers from table II.B.1.

70.7.9 For hollow, thin wall threaded parts as the wall thickness of either or both the internal and external members becomes thin, the tendency of the external member to enlarge and the internal member to neck down in the thread means that an LE greater than given by formula must be used, also that the tolerances on minor diameter of the internal thread and major diameter of the external thread,  $TD_1$  and  $Td$ , must be small to obtain the maximum practicable depth of thread engagement. For components having threads on thin-wall tubing, tests under actual working conditions should be made to determine proper selection of wall thicknesses, length of engagement, and pitch of thread.

#### 80. Thread proportions in relation to tapping.

80.1 In the production of threads it is considered impractical to tap a thread unless its nominal diameter is greater than six times the basic thread height; therefore, when the ratio of  $D$  to  $h$  is less than 6, the use of a larger diameter, a finer pitch of thread, or both, should be considered.

80.2 The size of  $D_1$  is a factor in controlling tap breakage. Tap breakage is infrequent if the diameter of the tap is over 0.5 in. or if the length of thread to be tapped is less than 0.5D. For sizes less than 0.5 in. and length of thread over 0.5D, tap breakage can be minimized by use of a large  $D_1$ , that is  $TD_1$  maximum. However, this means that LE may have to be increased to develop the full strength of the screw.



## 90. Examples of thread design.

90.1 Gun barrel thread. A gun barrel is subjected to an internal explosive pressure that produces a tensile stress in the threaded end. The length of engagement of the threads should be sufficient to produce a minimum area in shear on the threads of the screw in line with the minor diameter of the tapped hole threads equal to twice the stress area of the threaded portion of the barrel. Assume that the thread on the barrel is 1.500-8UN-2A and the minimum internal diameter of the barrel at the threaded end is 0.792 inch.

Note: Symbol notation and formula numbers in parenthesis are in accordance with tables II.B.1 and II.B.2.

- a. Required length of engagement is found using formula (14) for a hollow part.

$$LE = \frac{2 \left( A_s - 0.7854 d_h^2 \right)}{3.1416n D_1 \max \left[ \frac{1}{2n} + 0.57735 \left( d_2 \min - D_1 \max \right) \right]}$$

with  $A_s = 0.7854 \left( d_{\text{bsec}} - \frac{0.9743}{n} \right)^2$ . In this case,  $A_s$  may be read as

1.492 from table 13 of ASME B1.1-1989.

$$d_h = 0.792$$

$$n = 8$$

$$D_1 \max = 1.390 \text{ from table 3A of ASME B1.1-1989.}$$

$$d_2 \min = 1.4093 \text{ from table 3A of ASME B1.1-1989.}$$

- b. Calculating from the above yields a required length of engagement of 0.777 inch. By reducing the internal thread minor diameter tolerance by half, the resulting  $D_1 \max$  is reduced to 1.3775 inches, and the required length of engagement is reduced to 0.714 inch.

FED-STD-H28/2B

90.2 Screws mounting bracket to cast iron part. The dimension is required for the largest steel cap screw that can be used to hold a bracket on a cast iron body. The tensile strength of the steel is 60,000 psi, the tensile strength of the cast iron 20,000 psi, and the thickness of the cast iron is such that the length of thread engagement cannot exceed 1.750 in. The screws on the top side of the bracket will be in tension.

Note: Symbol notation and formula numbers in parenthesis are in accordance with tables II.B.1 and II.B.2.

- a. Since the external thread material is considerably stronger than that of the internal thread material, in accordance with 70.7.5, formula (16) will be used to calculate the length of engagement required. This formula is applied for LE based upon shear of the internal thread. To confirm this assumption,  $R_1/R_2$  should be calculated.
- b.  $R_1$  cannot be calculated from formula (8) until a thread size is selected. By definition, however,  $R_1$  is the ratio of external thread shear area to internal thread shear area. An approximation of  $R_1$ , can be made using the simplified formulas for shear areas so

$$\text{Approximate } R_1 = \frac{\text{Formula (5)}}{\text{Formula (3)}} = 0.833$$

- c.  $R_2$  is calculated from formula (9).

$$R_2 = \frac{UTS_n}{UTS_s} = \frac{20000}{60000} = 0.333$$

- d. From b and c above,  $R_1/R_2 = 2.5$  approximately. This value being greater than 1 confirms the use of formula (16) for calculation of length of engagement.
- e. From formula (16) it is seen that the length of engagement must be approximately 2.5 times as long as that required if shear in the external thread were the controlling factor. Thus, since the maximum available LE is 1.750 inches, the approximate LE required for the screw to develop full strength is  $1.750/2.5 = 0.700$  inch.
- f. Inasmuch as the hole is tapped in cast iron, a relatively coarse thread would be required, that is UNC or coarser. The most readily available screws would be UNC. Select thread sizes from figure 2.B.2 which yield LE of approximately 0.700 inch. Figure 2.B.2 was developed from formula (15).

For 1" - 8UNC,  $LE/D = 0.594$  and  $LE = 0.594$

For  $1 \frac{1}{8}$  - 7UNC,  $LE/D = 0.592$  (est.) and  $LE = 0.656$

For  $1 \frac{1}{4}$  - 7UNC,  $LE/D = 0.600$  (est.) and  $LE = 0.750$

- g. For a bracket screw the preferred thread class is 2A so the selected thread is  $1\frac{1}{8}$  - 7UNC-2A for the cap screw. The corresponding hole in the body would have a  $1\frac{1}{8}$  - 7UNC-2B thread.
- h. The thread should be checked in accordance with formula (16). Formula (16) may be expressed as follows:

$$LE = \frac{2A_s}{3.1416D_1 \min \times \frac{3}{4}} \times \frac{R_1}{R_2}$$

with  $A_s = 0.7854 \left( d_{bsc} - \frac{0.9743}{n} \right)^2$ . In this case,  $A_s$  may be read as

0.763 from table 8 of ASME B1.1-1989.

$D_1 \min = 0.970$  from table 3A of ASME B1.1-1989.

$$R_1 = \frac{\text{Formula (6b)}}{\text{Formula (2a)}} = \frac{\frac{3}{4} \times D_1 \min}{n \cdot d_{\min} \left[ \frac{1}{2n} \times 0.57735 (d_{\min} - D_2 \max) \right]}$$

$$n = 7$$

$d_{\min} = 1.1064$  from table 3A of ASME B1.1-1989.

$D_2 \max = 1.0416$  from table 3A of ASME B1.1-1989.

$$\text{so } R_1 = 0.863$$

$$R_1 = 0.333 \text{ from c above.}$$

- i. Calculating from the above yields a required length of engagement of 1.729 inches. This is acceptable since it is less than the maximum available engagement length of 1.750.

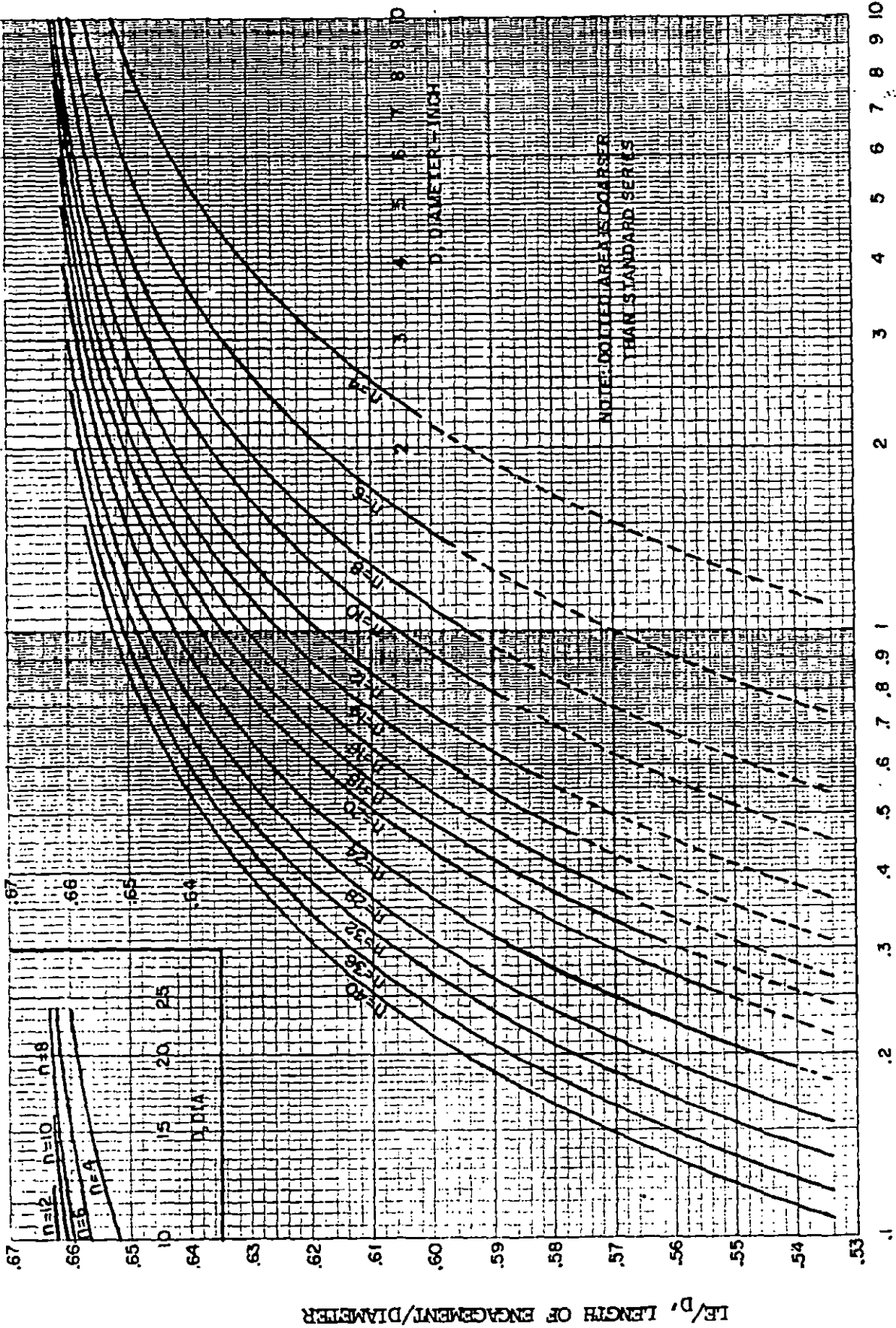


FIGURE 2.B.2 CHART FOR DETERMINING NOMINAL (MINIMUM) LENGTH OF THREAD ENGAGEMENT D, DIAMETER-INCH

## APPENDIX C

## AMERICAN NATIONAL FORM OF THREAD

100. Scope. This appendix provides general information about the obsolete American National form screw threads. It is not a mandatory part of the standard. See 5.2.1 for selection of standard Unified screw thread classes to replace the American National form threads.

110. Profiles. Basic profile is the same as that of the Unified screw thread except that the width of the flat at the root is  $0.125P$ . The design profile for internal threads is the same as that of the Unified screw thread, i.e., width of flat at the root is  $0.250P$ .

120. Thread classes. There are 5 classes of American National form threads. For information on Class 5, see FED-STD-H28/23, Class 5 Interference-Fit Screw Threads. See below for other classes.

120.1 Allowances. Only Class 1 external threads have an allowance. Class 4 external threads have a negative allowance on the pitch diameter only. Allowances are shown in Table II.C.1.

120.2 Tolerances. Pitch diameter tolerances for external and internal threads are shown in Table II.C.2. External thread major diameter tolerances for Classes 1 and 2 equal twice their respective pitch diameter tolerances; the Class 3 and 4 tolerances are the same as the Class 2. Internal minor diameter tolerances for Classes 1, 2, 3 and 4 are equal to 0.1 times the design (minimum) minor diameters.

120.3 Formulas.

Note: Pitch,  $P = 1/\text{threads per inch.}$

120.3.1 Internal thread.

Min. major dia. = basic major dia.

Min. pitch dia. = min. major dia. -  $0.649519P$

Max. pitch dia. = min. pitch dia. +  $TD_2$  from Table II.C.2

Min. minor dia. = min. major dia. -  $1.082532P$

Max. minor dia. = min. minor dia. + 0.1 (min. minor dia.)

120.3.2 External thread.

Class 1 max. major dia. = basic major dia. -  $es_1$  from Table II.C.1

Classes 2, 3, 4 max. major dia. = basic major diameter

~~FED-STD-H28/2B~~

Min. major dia. = max. major dia. -  $Td$  from Table II.C.2

Classes 1, 2, 3 max. pitch dia. = max. major dia. -  $0.649519P$

Class 4 max. pitch dia. = max. major dia. -  $0.649519P + es_A$   
from Table II.C.1

Min. pitch dia. = max. pitch dia. -  $Td_2$  from Table II.C.2

Max. minor dia. = max. major dia. -  $1.226869P$

130. Designations. Standard American National form threads are designated the same as the Unified threads except that series indicator does not use the "U" and class does not have the "A" or "B" indication for "external" or "internal". Thus, a standard thread designation might read "1/2-13NC-2", for example. A series designator "NS" is used for special combinations of diameters, pitches and lengths of engagement.

140. Gages. Gages are designed in accordance with the principles of Unified thread gage design. See FED-STD-H28/6, Gages and Gaging for Unified Screw Threads - UN and UNR Thread Forms.

TABLE H.C.1 - Allowance for American National Screw Threads:

| Threads per<br>inch, tpi | Class 1<br>allowance $es_1$ | Class 4 negative<br>allowance, $es_4$ |
|--------------------------|-----------------------------|---------------------------------------|
|                          | inch                        | inch                                  |
| 80                       | 0.0007                      |                                       |
| 72                       | 0.0007                      |                                       |
| 64                       | 0.0007                      |                                       |
| 56                       | 0.0008                      |                                       |
| 48                       | 0.0009                      |                                       |
| 44                       | 0.0009                      |                                       |
| 40                       | 0.0010                      |                                       |
| 36                       | 0.0011                      |                                       |
| 32                       | 0.0011                      |                                       |
| 28                       | 0.0012                      | 0.0002                                |
| 24                       | 0.0013                      | 0.0003                                |
| 20                       | 0.0015                      | 0.0003                                |
| 18                       | 0.0016                      | 0.0003                                |
| 16                       | 0.0018                      | 0.0004                                |
| 14                       | 0.0021                      | 0.0004                                |
| 13                       | 0.0022                      | 0.0004                                |
| 12                       | 0.0024                      | 0.0005                                |
| 11                       | 0.0026                      | 0.0005                                |
| 10                       | 0.0028                      | 0.0006                                |
| 9                        | 0.0031                      | 0.0006                                |
| 8                        | 0.0034                      | 0.0007                                |
| 7                        | 0.0039                      | 0.0008                                |
| 6                        | 0.0044                      | 0.0009                                |
| 5                        | 0.0052                      | 0.0010                                |
| 4 1/2                    | 0.0057                      | 0.0011                                |
| 4                        | 0.0064                      | 0.0013                                |

FED-STD-H28/2B

TABLE II.C.2 - Tolerances for American National Screw Threads <sup>1/</sup>

| Threads<br>per inch,<br>tpi | Pitch diameter tolerances<br>Internal and external threads |             |             |             | Major dia. tols.<br>External threads |                |
|-----------------------------|--|-------------|-------------|-------------|--------------------------------------|----------------|
|                             | Class 1  | Class 2     | Class 3     | Class 4     | Class 1                              | Classes 2,3,4, |
|                             | $TD_2/Td_2$  | $TD_2/Td_2$ | $TD_2/Td_2$ | $TD_2/Td_2$ | Td                                   | Td             |
|                             | inch   | inch        | inch        | inch        | inch                                 | inch           |
| 80                          | 0.0024   | 0.0017      | 0.0013      |             | 0.0048                               | 0.0034         |
| 72                          | 0.0025   | 0.0018      | 0.0013      |             | 0.0050                               | 0.0036         |
| 64                          | 0.0026   | 0.0019      | 0.0014      |             | 0.0052                               | 0.0038         |
| 56                          | 0.0028   | 0.0020      | 0.0015      |             | 0.0056                               | 0.0040         |
| 48                          | 0.0031   | 0.0022      | 0.0016      |             | 0.0062                               | 0.0044         |
| 44                          | 0.0032   | 0.0023      | 0.0016      |             | 0.0064                               | 0.0046         |
| 40                          | 0.0034   | 0.0024      | 0.0017      |             | 0.0068                               | 0.0048         |
| 36                          | 0.0036   | 0.0025      | 0.0018      |             | 0.0072                               | 0.0050         |
| 32                          | 0.0038   | 0.0027      | 0.0019      |             | 0.0076                               | 0.0054         |
| 28                          | 0.0043   | 0.0031      | 0.0022      | 0.0011      | 0.0086                               | 0.0062         |
| 24                          | 0.0046   | 0.0033      | 0.0024      | 0.0012      | 0.0092                               | 0.0066         |
| 20                          | 0.0051   | 0.0036      | 0.0026      | 0.0013      | 0.0102                               | 0.0072         |
| 18                          | 0.0057   | 0.0041      | 0.0030      | 0.0015      | 0.0114                               | 0.0082         |
| 16                          | 0.0063   | 0.0045      | 0.0032      | 0.0016      | 0.0126                               | 0.0090         |
| 14                          | 0.0070   | 0.0049      | 0.0036      | 0.0018      | 0.0140                               | 0.0098         |
| 13                          | 0.0074   | 0.0052      | 0.0037      | 0.0019      | 0.0148                               | 0.0104         |
| 12                          | 0.0079   | 0.0056      | 0.0040      | 0.0020      | 0.0158                               | 0.0112         |
| 11                          | 0.0085   | 0.0059      | 0.0042      | 0.0021      | 0.0170                               | 0.0118         |
| 10                          | 0.0092   | 0.0064      | 0.0045      | 0.0023      | 0.0184                               | 0.0128         |
| 9                           | 0.0100   | 0.0070      | 0.0049      | 0.0024      | 0.0200                               | 0.0140         |
| 8                           | 0.0111   | 0.0076      | 0.0054      | 0.0027      | 0.0222                               | 0.0152         |
| 7                           | 0.0124   | 0.0085      | 0.0059      | 0.0030      | 0.0248                               | 0.0170         |
| 6                           | 0.0145   | 0.0101      | 0.0071      | 0.0036      | 0.0290                               | 0.0202         |
| 5                           | 0.0169   | 0.0116      | 0.0082      | 0.0041      | 0.0338                               | 0.0232         |
| 4 1/2                       | 0.0184   | 0.0127      | 0.0089      | 0.0044      | 0.0368                               | 0.0254         |
| 4                           | 0.0204   | 0.0140      | 0.0097      | 0.0048      | 0.0408                               | 0.0280         |

<sup>1/</sup> Minor diameter tolerance for internal thread is one-tenth of the minimum minor diameter.



MILITARY INTERESTS:

Custodians:

Army - AR  
Navy - AS  
Air Force - 99

Review Activities:

Army - CR, EA, ER, ME  
Air Force - 11, 15, 82

User Activities:

Army - AT, MI

CIVIL AGENCY COORDINATING ACTIVITIES:

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DOT - ACO  
NASA - JFK

PREPARING ACTIVITY:

DLA - IS

(DoD Project THDS-0082)

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(See Instructions - Reverse Side)

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|---|--|--|--|
| 1. DOCUMENT NUMBER<br>FED. STD. H28/2B                        |  | 2. DOCUMENT TITLE<br>Unified Inch Screw Threads-UN and UNR Thread Forms  |  |
| 3a. NAME OF SUBMITTING ORGANIZATION                           |  | 4. TYPE OF ORGANIZATION (Mark one)   |  |
| b. ADDRESS (Street, City, State, ZIP Code)                    |  | <input type="checkbox"/> VENDOR<br><input type="checkbox"/> USER<br><input type="checkbox"/> MANUFACTURER<br><input type="checkbox"/> OTHER (Specify): _____ |  |
| 5. PROBLEM AREAS  |  |  |  |
| a. Paragraph Number and Wording:                              |  |  |  |
| b. Recommended Wording:                                       |  |  |  |
| c. Reason/Rationale for Recommendation:                       |  |  |  |
| 6. REMARKS  |  |  |  |
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