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ASME B1.5-1997

ACME SCREW THREADS

(Revision of ASME/ANSI B1.5-1988)

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FOREWORD

When created prior to 1895, Acme screw threads were intended to replace square threads and a variety of threads of other forms used chiefly for the purpose of traversing motion on machines, tools, etc. Acme screw threads are now extensively used for a variety of purposes. Long-length Acme threads are used for controlled movements on machine tools, testing machines, jacks, aircraft flaps, and conveyors. Short-length threads are used on valve stems, hose connectors, bonnets on pressure cylinders, steering mechanisms, and camera lens movement.

The Standards Committee on the Standardization and Unification of Screw Threads, B1, was organized in June 1921, with the Society of Automotive Engineers and the American Society of Mechanical Engineers as joint sponsors under the procedure of the American Standards Association (ASA), now the American National Standards Institute (ANSI). This Committee was reorganized in May 1929, and its work was divided among five Subcommittees as follows: No. 1 on Scope and Arrangement of American Standard; No. 2 on Terminology and Form of Thread, Except Gages; No. 3 on Special Threads and Twelve Pitch Series, Except Gages; No. 4 on Acme Threads, Except Gages; and No. 5 on Screw Thread Gages.

National standardization of Acme screw threads in the United States was begun in 1932 when Subcommittee No. 4 on Acme Threads of Standards Committee B1 held its first meeting in New York. A report was presented on the types of Acme threads and the range of sizes and pitches in use in this country. It was prepared by C. W. Bettcher with the assistance of F. L. Woodcock. This report developed into a draft standard and was finally approved as an American Standard with the designation ASA B1.3-1941. It contained a section of introductory notes, and tables covering general purpose screws and general purpose nuts, basic dimensions of general purpose Acme threads with special and standard pitches, basic dimensions of 29 deg stub thread, measurements over three wires for Acme threads, basic dimensions of 60 deg stub thread, and basic proportions for modified square thread.

In December 1942, to meet the war emergency, the National Aircraft Standards Committee of the Aeronautical Chamber of Commerce requested the ASA to consider the setting up of an American War Standard for special Acme screw threads for use in aircraft construction. Recognizing the vital importance of aircraft production to the war effort, the ASA initiated this project at once and organized a Special Committee to develop the Standard. Drafts of this proposed American War Standard were submitted, first on behalf of the National Aircraft Standards Committee and later by D. R. Miller of the National Bureau of Standards. The latter draft, which was submitted also to the Interdepartmental Screw Thread Committee established by the U.S. Departments of War, Navy, and Commerce, served as the basis for the development of the American War Standard. The final draft, dated November 20, 1944, was unanimously approved by the members of the ASA War Committee on Acme Threads and the General ASA War Committee on Screw Threads. This draft received final ASA approval on January 9, 1945, and was designated American War Standard B1.5-1945.

In April 1946, the Subcommittees of the Standards Committee were reorganized to take over the job of the ASA War Committees. Subcommittee No. 2 on Acme and Stub Acme Threads revised the War Standard on Acme Screw Threads and, on March 31, 1948, distributed the January 1948 draft to industry for criticism and comment.

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The final draft of the proposed revision to the 1945 Edition of this Standard was completed in June 1951. It was submitted to Standards Committee B1 for letter ballot on September 17, 1951, and was approved with minor amendments. Following approval by the sponsor organizations, the proposed Standard was submitted to the ASA for approval and designation as an American Standard. This was granted May 7, 1952.

The next revision added the no allowance Class 5G thread. Approval by ANSI was granted on March 26, 1973. Corrections were made in the revision approved May 11, 1977.

Data for Classes 5G, 5C, and 6G was transferred to Appendices D and E for reference, and this revision was approved by ANSI on January 11, 1988.

The present revision to the Standard includes the addition of gage tables and drawings for Gaging Systems 21, 22, and 23, table changes to conform to ASME B1.30M, lead and angle tolerances for product threads, measurement uncertainty values for Acme thread gages, and descriptions and drawings for indicating gages. The pitch diameter compensation table and text were deleted and replaced with data on standard gage blanks for gage length with text on pitch diameter adjustment for gage length over two diameters. Table values of gage dimensions for general purpose and centralizing Acme threads were added, along with formulas to determine diameters of multiple-start threads. Recommendation in the use of formulas and examples to calculate pitch diameter measurement over wires was revised. Additionally, the Appendix contains revision of alternate centralizing Acme threads and of multiple-start threads, and was expanded to include ball measurement of internal pitch diameter, limit gaging of setting ring gages, gaging of problem areas, Acme tolerances over 5 in., and means for determining limits of size for special diameter/pitch combinations.

This Standard was approved by the American National Standards Institute on December 9, 1997.

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Screw Threads

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ACME SCREW THREADS

1 GENERAL

This Standard provides for two general applications of Acme threads: namely, general purpose and centralizing.

The limits and tolerances in this Standard relate to single-start Acme threads and may be used, if considered suitable, for multiple-start Acme threads. The latter threads are used to provide relatively fast traversing motion when necessary.

The three classes (2G, 3G, and 4G) of general purpose threads have clearances on all diameters for free movement. This thread relies on the thread flanks to maintain concentric operation.

The three classes of centralizing threads have a limited clearance at the major diameters of the external and internal threads so that a bearing at the major diameter maintains approximate alignment of the thread axis and prevents wedging on the flanks of the threads.

For any combination of the three classes of threads covered in this Standard, some end play or backlash will result. This is unavoidable for interchangeable products. When backlash or end play is objectionable, some mechanical means should be provided to eliminate the condition. In any case, sufficient end play must be left to provide a close running fit.

In addition to limiting dimensions for the standard series of diameters and pitches of Acme single-start threads, tables of tolerances, in terms of pitch and diameter, provide for a wide choice of diameters for a given standard pitch. By using the formulas for diameter and pitch increments, the pitch diameter tolerances for special diameters and pitches can be determined for each class. Formulas and data are also provided for allowances on external threads and major and minor diameter allowances and tolerances.

The Appendices provide text and dimensions on the following:

(a) Alternate Centralizing Acme Threads. Appendix A uses the minor diameter to ensure concentric operation.

(b) Multiple-Start Acme Threads. Appendix B includes formulas for limits of size. Multiple-start threads may require additional allowances and/or tolerances for satisfactory operation.

(c) General Purpose Acme Threads, Class 5G. See Appendix C.

(d) Centralizing Acme Threads, Classes 5C and 6C. See Appendix D.

(e) Three-Wire Method of Measurement of Pitch Diameter of 29 deg External Acme Screw Threads. See Appendix E.

(f) Ball Methods for Internal Pitch Diameter Measurement of 29 deg Acme Screw Threads. See Appendix F.

(g) Go Gage Compensation, Calculation of Flank Angle, Limit Gaging of Setting Rings, and Gaging Problem Areas. See Appendix G.

(h) Tolerances for Acme Screw Thread Gages Over 5 in. See Appendix H.

(i) Determining Limits of Size for Special Diameter/Pitch Combinations. See Appendix I.

1.1 Scope

This Standard provides specifications, formulas, and tables.

1.2 Federal Government Use

When this Standard is approved by the Department of Defense and federal agencies and is incorporated into FED-STD-H28/12, Screw Thread Standards for Federal Services, Section 12, the use of this Standard by the federal government is subject to all the requirements and limitations of FED-STD-H28/12.

1.3 References

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

ASME B1 Technical Report: Measurement Uncertainty for 60 deg Screw Thread Gage Element

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

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

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

ASME B1.30M, Screw Threads — Standard Practice for Calculating and Rounding Dimensions

ASME B47.1, Gage Blanks

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1.4 Reference Temperature

The reference temperature is 68°F (20°C) for dimensions listed.

1.5 Units of Measure

All dimensions and values are expressed in inches unless otherwise noted.

1.6 Terminology

Definitions, terms, and symbols relating to Acme screw threads are found in ASME B1.7M. Explanation of ISO fundamental deviation symbols used for allowance in this Standard are:

EI: lower deviation, internal thread allowance (fundamental deviation).

es: upper deviation, external thread allowance (fundamental deviation); es is always negative for an allowance fit or zero for no allowance.

1.7 Computer-Generated Size

All computer-generated values for standard sizes herein are identical to previous Acme publications. For a nonstandard nominal size, D, apply the next larger nominal size given in the table. For computer calculation of Acme product and gage size or tolerance, use ASME B1.30M and formulas herein. Parties should be advised in contract.

2 SPECIFICATIONS FOR GENERAL PURPOSE ACME SCREW THREADS

2.1 Angle of Thread

The included angle between the flanks of the thread, measured in an axial plane, shall be 29 deg. The line bisecting this 29 deg angle shall be perpendicular to the axis of the screw thread.

2.2 Pitch and Lead of Thread

The pitch of the thread is the distance, measured parallel to its axis, between corresponding points on adjacent thread forms. The lead of a thread is the distance traversed in one revolution of a screw thread. On multiple-start threads, the lead equals pitch multiplied by the number of starts.

2.3 Height of Thread

The basic height of the thread is equal to one-half of the pitch.

2.4 Thickness of Thread

The basic thickness of the thread profile at the pitch line is one-half of the pitch.

2.5 Allowance (Minimum Clearance) at Major and Minor Diameters

A minimum diametral clearance is provided at the minor diameter of all threads by establishing the maximum minor diameter of the external thread 0.020 in. less than the basic minor diameter for 10 threads/in. and coarser, and 0.010 in. less for finer pitches.

A minimum diametral clearance at the major diameter is obtained by establishing the minimum major diameter of the internal thread 0.020 in. greater than the basic major diameter for 10 threads/in. and coarser, and 0.010 in. greater for finer pitches.

2.6 Chamfers and Fillets

External threads may have the crest corners chamfered at an angle of 45 deg with the axis to a maximum depth of $P/15$. This corresponds to a maximum width of chamfer flat of $0.0945P$.

The internal and external threads may have optional fillets; see Fig. 3.

2.7 Basic Thread Form Dimensions

The basic dimensions of the Acme thread form for the most generally used pitches are given in Table 1. The basic thread profile is symmetrical and is illustrated in Fig. 1. Design profiles are shown in Fig. 2.

2.8 General Purpose Standard Acme Thread Series

A selected series of diameters and associated pitches of Acme threads, listed in Table 2, are recommended as preferred. These diameters and pitches have been carefully selected to meet present needs with the fewest number of items in order to reduce to a minimum the inventory of both tools and gages. For sizes over 5 in., see Appendix H.

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TABLE 1 GENERAL PURPOSE ACME SCREW THREAD FORM, DESIGN DIMENSIONS

Threads/ in., n	Pitch, P	Height of Thread (Basic), $h = P/2$	Total Height of Thread, $h_s = h + 1/2$ Allowance [Note (1)]	Thread Thickness (Basic), $t = P/2$	Width of Flat at: Crest of Internal Thread (Basic), $F_{cn} = 0.3707\,P$	Width of Flat at: Root of Internal Thread, $F_{rn} = 0.3707\,P - 0.259 \times$ Allowance [Note (1)]
16	0.06250	0.03125	0.0362	0.03125	0.0232	0.0206
14	0.07143	0.03571	0.0407	0.03571	0.0265	0.0239
12	0.08333	0.04167	0.0467	0.04167	0.0309	0.0283
10	0.10000	0.05000	0.0600	0.05000	0.0371	0.0319
8	0.12500	0.06250	0.0725	0.06250	0.0463	0.0411
6	0.16667	0.08333	0.0933	0.08333	0.0618	0.0566
5	0.20000	0.10000	0.1100	0.10000	0.0741	0.0689
4	0.25000	0.12500	0.1350	0.12500	0.0927	0.0875
3	0.33333	0.16667	0.1767	0.16667	0.1236	0.1184
2½	0.40000	0.20000	0.2100	0.20000	0.1483	0.1431
2	0.50000	0.25000	0.2600	0.25000	0.1853	0.1802
1½	0.66667	0.33333	0.3433	0.33333	0.2471	0.2419
1⅓	0.75000	0.37500	0.3850	0.37500	0.2780	0.2728
1	1.00000	0.50000	0.5100	0.50000	0.3707	0.3655

NOTE:
(1) See Table 4.

2.9 Classification and Tolerances, General Purpose Acme Threads

There are established herein three classes of threads for general purpose: 2G, 3G, and 4G.

These classes, together with the accompanying specifications, are for the purpose of ensuring interchangeability of Acme threaded parts. Each user is free to select the classes best adapted to his particular needs. It is suggested that external and internal threads of the same class be used together for general purpose assemblies, Class 2G being the preferable choice. If less backlash is desired, Classes 3G and 4G are provided.

2.10 Basic Diameters

The maximum major diameter of the external thread is basic and is the nominal size for all classes. The minimum pitch diameter of the internal thread is basic and is equal to the basic major diameter minus the basic thread height, h. The basic minor diameter is the minimum minor diameter of the internal thread. It is equal to the basic major diameter minus twice the basic thread height, $2h$.

2.11 Length of Engagement

The tolerances specified herein are applicable to all lengths of engagement not exceeding twice the basic major diameter.

2.12 Tolerances

2.12.1 Tolerance Zone Definition. The definition of the Acme thread is dimensioned by pitch diameter reference locations in perfect 29 deg thread forms with crest and root limited by the corresponding major and minor diameters with corner fillet limitations. This tolerance zone between the maximum and minimum thread profiles defines the thread. There are additional limitations, within the tolerance zone, on the elements flank angle and lead.

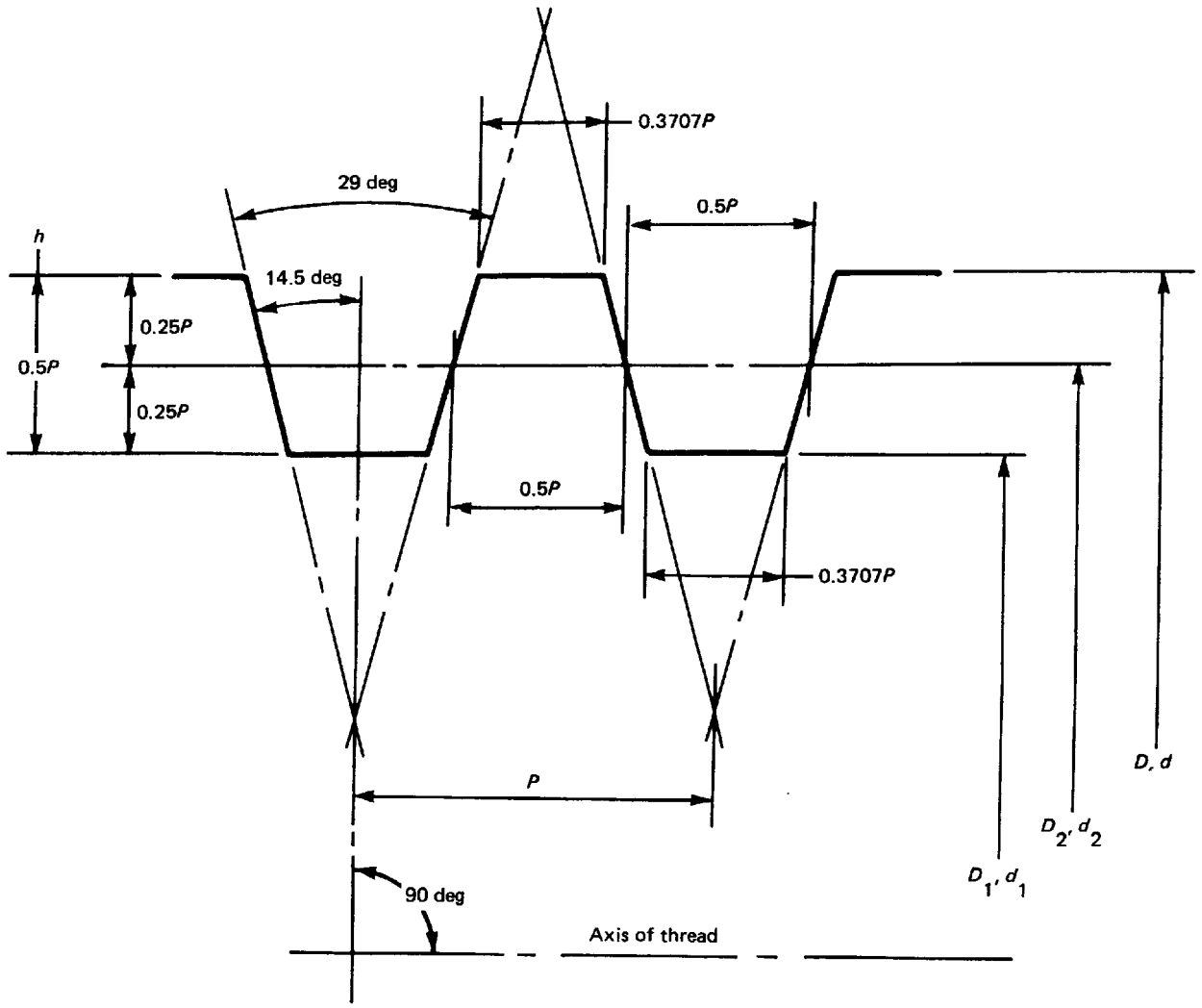
2.12.2 Tolerance Direction. The tolerances on diameters of the internal thread are plus, being applied from the minimum sizes to above the minimum sizes.

The tolerances on diameters of the external threads are minus, being applied from the maximum sizes to below the maximum sizes.

2.12.3 Tolerances on Major and Minor Diameters. The tolerances on major and minor diameters of external and internal threads are based on the data in Table 3; the values are listed in Table 4.

2.12.4 Tolerance on Pitch Diameter. The pitch diameter tolerances for an external and internal thread of a given class are the same. These tolerances determine the tolerance zone included between the maximum and minimum boundary limits. The tolerance Classes 2G, 3G, and 4G are given in Tables 5, 6, and 7. The ratio

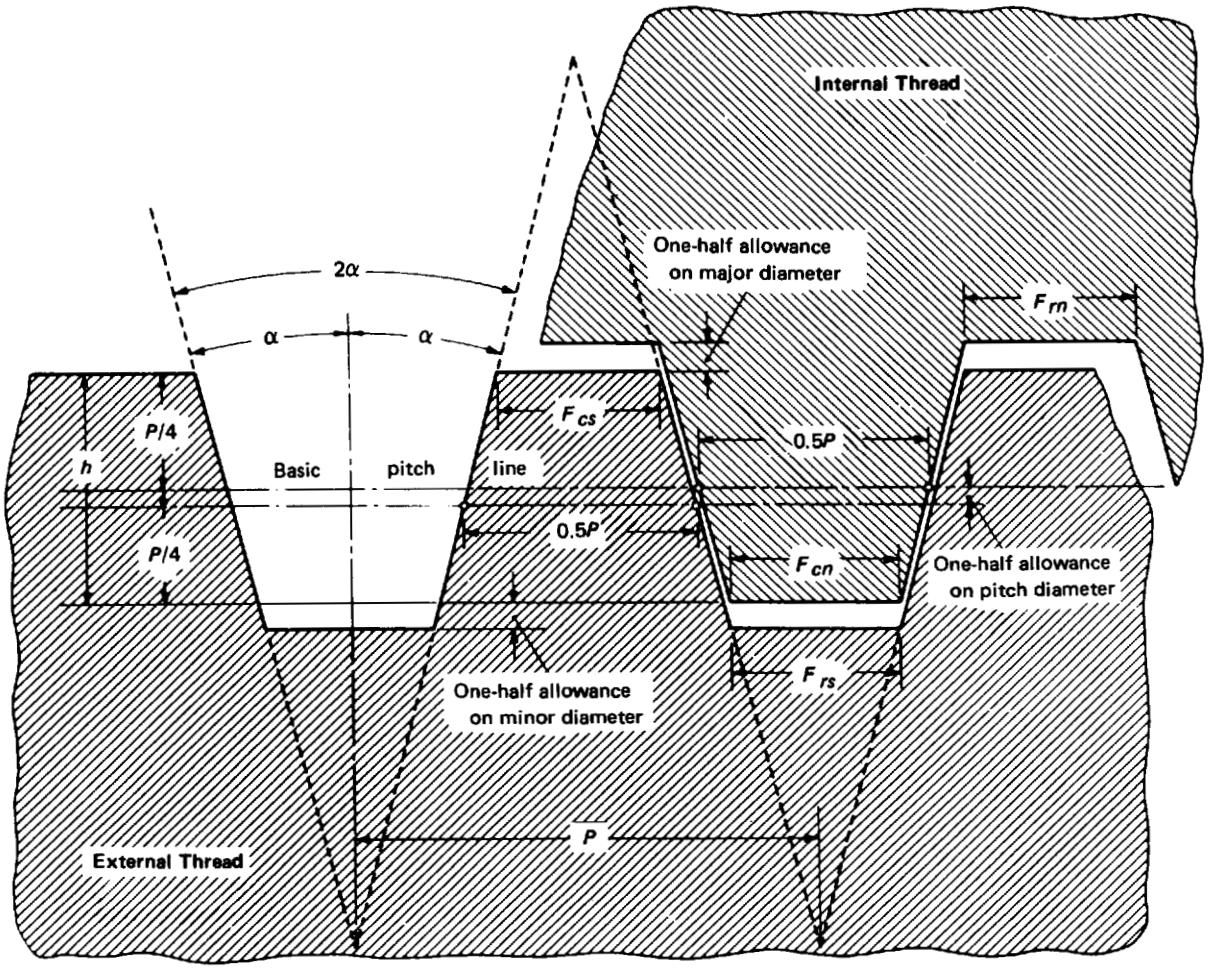
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D = basic major diameter, internal thread
D_1 = basic minor diameter, internal thread
D_2 = basic pitch diameter, internal thread
P = pitch
d = basic major diameter, external thread
d_1 = basic minor diameter, external thread
d_2 = basic pitch diameter, external thread
h = basic thread height

FIG. 1 PROFILE FOR ACME SCREW THREAD

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F_{cn} = basic width of flat of crest of internal thread
= 0.3707P

F_{cs} = width of flat of crest of external thread
= 0.3707P – 0.259 X pitch diameter allowance on external thread

F_{rn} = 0.3707P – 0.259 X (major diameter allowance on internal thread)

F_{rs} = 0.3707P – 0.259 X (minor diameter allowance on external thread – pitch diameter allowance on external thread)

P = pitch

h = basic height of thread
= P/2

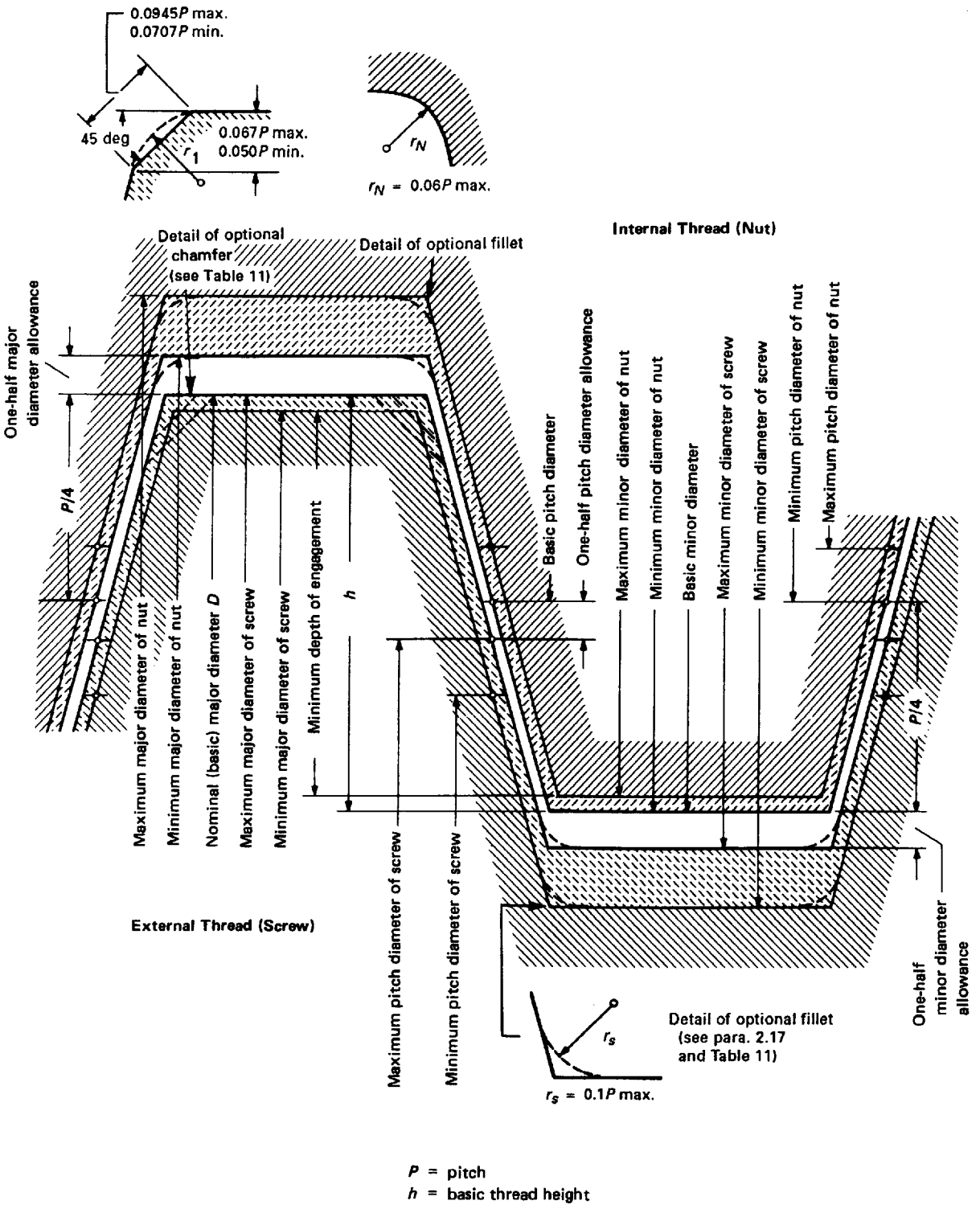
n = number of threads/in.

α = 14 deg 30 min

2α = 29 deg

FIG. 2 DESIGN PROFILE FOR EXTERNAL AND INTERNAL GENERAL PURPOSE ACME THREAD

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P = pitch
h = basic thread height

FIG. 3 DISPOSITION OF ALLOWANCES, TOLERANCES, AND CREST CLEARANCES FOR GENERAL PURPOSE SINGLE-START ACME THREADS (ALL CLASSES)

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TABLE 2 BASIC DIAMETERS AND THREAD DATA FOR GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES

Identification		Basic Diameters			Thread Data							
		Classes 2G, 3G, and 4G							Lead Angle at Basic Pitch Diameter			
Nominal Sizes, All Classes	Threads/ in., n	Major Diameter, D	Pitch Diameter, $D_2 = D - h$	Minor Diameter, $D_1 = D - 2h$	Pitch, P	Thickness at Pitch Line, $t = P/2$	Basic Height of Thread, $h = P/2$	Basic Width of Flat, $F = 0.3707\,P$	Classes 2G, 3G, and 4G, λ deg	min	Shear Area, Class 3G [Note (1)]	Stress Area, Class 3G [Note (2)]
1/4	16	0.2500	0.2188	0.1875	0.06250	0.03125	0.03125	0.0232	5	12	0.348	0.0285
5/16	14	0.3125	0.2768	0.2411	0.07143	0.03571	0.03571	0.0265	4	42	0.449	0.0475
3/8	12	0.3750	0.3333	0.2917	0.08333	0.04167	0.04167	0.0309	4	33	0.544	0.0699
7/16	12	0.4375	0.3958	0.3542	0.08333	0.04167	0.04167	0.0309	3	50	0.659	0.1022
1/2	10	0.5000	0.4500	0.4000	0.10000	0.05000	0.05000	0.0371	4	3	0.749	0.1288
5/8	8	0.6250	0.5625	0.5000	0.12500	0.06250	0.06250	0.0463	4	3	0.941	0.2042
3/4	6	0.7500	0.6667	0.5833	0.16667	0.08333	0.08333	0.0618	4	33	1.108	0.2849
7/8	6	0.8750	0.7917	0.7083	0.16667	0.08333	0.08333	0.0618	3	50	1.339	0.4149
1	5	1.0000	0.9000	0.8000	0.20000	0.10000	0.10000	0.0741	4	3	1.519	0.5354
1 1/8	5	1.1250	1.0250	0.9250	0.20000	0.10000	0.10000	0.0741	3	33	1.751	0.709
1 1/4	5	1.2500	1.1500	1.0500	0.20000	0.10000	0.10000	0.0741	3	10	1.983	0.907
1 3/8	4	1.3750	1.2500	1.1250	0.25000	0.12500	0.12500	0.0927	3	39	2.139	1.059
1 1/2	4	1.5000	1.3750	1.2500	0.25000	0.12500	0.12500	0.0927	3	19	2.372	1.299

(continued)

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TABLE 2 BASIC DIAMETERS AND THREAD DATA FOR GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES (CONT'D)

Identification		Basic Diameters			Thread Data							
		Classes 2G, 3G, and 4G							Lead Angle at Basic Pitch Diameter			
Nominal Sizes, All Classes	Threads/ in., n	Major Diameter, D	Pitch Diameter, $D_2 = D - h$	Minor Diameter, $D_1 = D - 2h$	Pitch, P	Thickness at Pitch Line, $t = P/2$	Basic Height of Thread, $h = P/2$	Basic Width of Flat, $F = 0.3707\ P$	Classes 2G, 3G, and 4G, λ deg	min	Shear Area, Class 3G [Note (1)]	Stress Area, Class 3G [Note (2)]
1¾	4	1.7500	1.6250	1.5000	0.25000	0.12500	0.12500	0.0927	2	48	2.837	1.851
2	4	2.0000	1.8750	1.7500	0.25000	0.12500	0.12500	0.0927	2	26	3.301	2.501
2¼	3	2.2500	2.0833	1.9167	0.33333	0.16667	0.16667	0.1236	2	55	3.643	3.048
2½	3	2.5000	2.3333	2.1667	0.33333	0.16667	0.16667	0.1236	2	36	4.110	3.869
2¾	3	2.7500	2.5833	2.4167	0.33333	0.16667	0.16667	0.1236	2	21	4.577	4.788
3	2	3.0000	2.7500	2.5000	0.50000	0.25000	0.25000	0.1853	3	19	4.786	5.27
3½	2	3.5000	3.2500	3.0000	0.50000	0.25000	0.25000	0.1853	2	48	5.73	7.50
4	2	4.0000	3.7500	3.5000	0.50000	0.25000	0.25000	0.1853	2	26	6.67	10.12
4½	2	4.5000	4.2500	4.0000	0.50000	0.25000	0.25000	0.1853	2	9	7.61	13.13
5	2	5.0000	4.7500	4.5000	0.50000	0.25000	0.25000	0.1853	1	55	8.54	16.53

NOTES:

(1) Values are per inch length of engagement of the external thread in line with the minor diameter crests of the internal thread. Computed from this formula:

$$\text{minimum shear area} = \pi D_1\,[0.5 + n \tan 14\tfrac{1}{2}\ \text{deg}\ (d_2 - D_1)]$$

Values given are the minimum shear area based on maximum D_1 and minimum d_2.

(2) Values given are the minimum stress area based on the mean of the minimum minor and pitch diameters of the external thread. Computed from this formula:

$$\text{minimum stress area} = \left(\frac{d_1\ \text{min.} + d_2\ \text{min.}}{4}\right)^2 \pi$$

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TABLE 3 TOLERANCES ON MAJOR AND MINOR DIAMETERS OF GENERAL PURPOSE EXTERNAL AND INTERNAL SINGLE-START THREADS

	Major Diameter		Minor Diameter	
Type of Thread	External Thread	Internal Thread	External Thread	Internal Thread
General purpose (all classes)	0.05 *P* [Note (1)] (0.005 in., min.)	0.020 in. for 10 pitch and coarser; 0.010 in. for finer pitches	1.5 x pitch diameter tolerance	0.05 *P* [Note (1)] (0.005 in., min.)

NOTE:
(1) To avoid a complicated formula and still provide an adequate tolerance, the pitch factor is used as a base with the minimum tolerance value set at 0.005 in.

TABLE 4 TOLERANCES AND ALLOWANCES FOR MAJOR AND MINOR DIAMETERS, GENERAL PURPOSE ACME SINGLE-START SCREW THREADS

	Allowance From Basic:		Tolerance on Major Diameter	
Threads/ in., *n* [Note (1)]	Minor Diameter, All External Threads (Minus) [Note (2)] / Major Diameter, Internal Threads (*EI*) (Plus) [Note (3)]	Tolerance on Minor Diameter, All Internal Threads (Plus), 0.05*P* (Min. = 0.005 in.) [Note (4)]	Minus on External Threads, 0.05*P* (Min. = 0.005 in.) [Note (4)]	Plus on Internal Threads
16	0.010	0.0050	0.0050	0.010
14	0.010	0.0050	0.0050	0.010
12	0.010	0.0050	0.0050	0.010
10	0.020	0.0050	0.0050	0.020
8	0.020	0.0062	0.0062	0.020
6	0.020	0.0083	0.0083	0.020
5	0.020	0.0100	0.0100	0.020
4	0.020	0.0125	0.0125	0.020
3	0.020	0.0167	0.0167	0.020
2	0.020	0.0250	0.0250	0.020

GENERAL NOTE: Tolerance on minor diameter of all external threads is 1.5 times pitch diameter tolerance.
NOTES:
(1) Intermediate pitches take the values of the next coarser listed pitch.
(2) The minimum clearance at the minor diameter between the internal and external thread is equal to values in the second column.
(3) The minimum clearance at the major diameter between the internal and external thread is equal to values in the second column.
(4) To avoid a complicated formula and still provide an adequate tolerance, the pitch factor is used as a base with the minimum tolerance value set at 0.005 in.

of the pitch diameter tolerance of Classes 2G, 3G, and 4G are 3.0, 1.4, and 1, respectively. Pitch diameter tolerance is equal to the pitch increment plus the diameter increment.

$$\text{Class 2G pitch diameter tolerance} = 0.030\sqrt{P} + 0.006\sqrt{D}$$

$$\text{Class 3G pitch diameter tolerance} = 0.014\sqrt{P} + 0.0028\sqrt{D}$$

$$\text{Class 4G pitch diameter tolerance} = 0.010\sqrt{P} + 0.002\sqrt{D}$$

where

D = nominal major diameter
P = pitch

Pitch diameter tolerance on product threads includes the effects of all variations in thread form and profile

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TABLE 5 PITCH DIAMETER TOLERANCES FOR SINGLE-START ACME SCREW THREADS, CLASSES 2G AND 2C

Threads/ in., n	Pitch Increment, $0.030\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]							
		1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8
16	0.007500	0.010500	0.010854	0.011174	0.011469	0.011743	0.012243	0.012696	...
14	0.008018	...	0.011372	0.011692	0.011987	0.012261	0.012761	0.013214	0.013630
12	0.008660	...	...	0.012334	0.012629	0.012903	0.013403	0.013856	0.014272
10	0.009487	...	...	0.013161	0.013456	0.013730	0.014230	0.014683	0.015099
8	0.010607	...	...	...	...	0.014850	0.015350	0.015803	0.016219
6	0.012247	...	...	...	...	...	...	0.017443	0.017859
5	0.013416	...	...	...	...	...	...	...	0.019028
4	0.015000	...	...	...	...	...	...	...	...
3	0.017321	...	...	...	...	...	...	...	...
2 1/2	0.018974	...	...	...	...	...	...	...	...
2	0.021213	...	...	...	...	...	...	...	...
1 1/2	0.024495	...	...	...	...	...	...	...	...
1 1/3	0.025981	...	...	...	...	...	...	...	...
1	0.030000	...	...	...	...	...	...	...	...
Diameter Increment, $0.006\sqrt{D}$ [Note (1)] →		0.003000	0.003354	0.003674	0.003969	0.004243	0.004743	0.005196	0.005612

Threads/ in., n	Pitch Increment, $0.030\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]							
		1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2	2 1/4
16	0.007500	...	...	...	...	...	...	...	...
14	0.008018	0.014018	...	...	...	...	...	...	...
12	0.008660	0.014660	0.015024	0.015368	...	...	...	...	...
10	0.009487	0.015487	0.015851	0.016195	0.016523	0.016835	0.017424	...	...
8	0.010607	0.016607	0.016971	0.017315	0.017643	0.017955	0.018544	0.019092	...
6	0.012247	0.018247	0.018611	0.018955	0.019283	0.019595	0.020184	0.020732	0.021247
5	0.013416	0.019416	0.019780	0.020124	0.020452	0.020764	0.021353	0.021901	0.022416
4	0.015000	...	0.021364	0.021708	0.022036	0.022348	0.022937	0.023485	0.024000
3	0.017321	...	...	...	...	0.024669	0.025258	0.025806	0.026321
2 1/2	0.018974	...	...	...	...	...	0.026911	0.027459	0.027974
2	0.021213	...	...	...	...	...	...	0.029698	0.030213
1 1/2	0.024495	...	...	...	...	...	...	...	...
1 1/3	0.025981	...	...	...	...	...	...	...	...
1	0.030000	...	...	...	...	...	...	...	...
Diameter Increment, $0.006\sqrt{D}$ [Note (1)] →		0.006000	0.006364	0.006708	0.007036	0.007348	0.007937	0.008495	0.009000

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TABLE 5 PITCH DIAMETER TOLERANCES FOR SINGLE-START ACME SCREW THREADS, CLASSES 2G AND 2C (CONT'D)

Threads/ in., n	Pitch Increment, $0.030\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]						
		2½	2¾	3	3½	4	4½	5
16	0.007500	...	...	...	...	...	...	...
14	0.008018	...	...	...	...	...	...	...
12	0.008660	...	...	...	...	...	...	...
10	0.009497	...	...	...	...	...	...	...
8	0.010607	...	...	...	...	...	...	...
6	0.012247	...	...	...	...	...	...	...
5	0.013416	0.022903	...	...	...	...	...	...
4	0.015000	0.024487	0.024950	0.025392	0.026225	0.027000	...	...
3	0.017321	0.026808	0.027271	0.027713	0.028546	0.029321	0.030049	0.030737
2½	0.018974	0.028461	0.028924	0.029366	0.030199	0.030974	0.031702	0.032390
2	0.021213	0.030700	0.031163	0.031605	0.032438	0.033213	0.033941	0.034629
1½	0.024495	...	...	0.034887	0.035720	0.036495	0.037223	0.037911
1⅓	0.025981	...	...	0.036373	0.037206	0.037981	0.038709	0.039397
1	0.030000	...	...	...	0.041225	0.042000	0.042728	0.043416
Diameter Increment, $0.006\sqrt{D}$ ⟶ [Note (1)]		0.009487	0.009950	0.010392	0.011225	0.012000	0.012728	0.013416

GENERAL NOTE: The equivalent tolerance on thread thickness is 0.259 times the pitch diameter tolerance.

NOTES:

(1) The pitch diameter tolerances shown in this Table equal the sum of the pitch increment and the diameter increment.

(2) For an intermediate nominal diameter, apply the pitch diameter tolerance for the next larger nominal diameter given in this Table. (See also para. 1.7.)

including lead (helix), flank angle, taper, and roundness. When gaged with Go/Not Go limit gaging per this Standard, the functional diameter/size is controlled within these limits over the length of engagement.

2.12.5 Tolerance on Lead. When measurement is specified, the allowable lead variation shall not exceed 0.258618 times one-half the pitch diameter tolerance for Classes 4G and 4C. For lead on multiple-start threads, see para. 4.4.3 or para. 5.1.3 and Appendix B.

2.12.6 Tolerance on 14.5 deg Flank Angle. When measurement is specified, the allowable variation is given in Table 8. These values apply to all classes. They approximate a change in functional diameter close to one-half the 4G pitch diameter tolerance. The pitch diameter equivalent was calculated as follows: approximately $0.018P$ times sum of the two flank angle variations in degrees, regardless of sign.

2.12.7 Tolerance on Circular Runout

(a) Acceptable. When measurement is specified, the circular runout (full indicator movement) between the major cylinder and the pitch cylinder of the external thread or the minor cylinder and pitch cylinder of the internal thread shall not exceed the external pitch diameter allowance given in Table 9.

(b) Limitations

(1) External thread: Runout (*FIM*) = (d *bsc* − d *measured*) + (d_2 *bsc* − d_2 *measured*)

(2) Internal thread: Runout (*FIM*) = (D_1 *measured* − D_1 *bsc*) + (D_2 *measured* − D_2 *bsc*)

2.12.8 Tolerance on Taper and Roundness. When measurement is specified, the tolerance on taper and roundness, respectively, shall not exceed one-half the pitch diameter tolerance.

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TABLE 6 PITCH DIAMETER TOLERANCES FOR SINGLE-START ACME SCREW THREADS, CLASSES 3G AND 3C

Threads/ in., n	Pitch Increment, $0.014\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]							
		1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8
16	0.003500	0.004900	0.005065	0.005215	0.005352	0.005480	0.005714	0.005925	...
14	0.003742	...	0.005307	0.005456	0.005594	0.005722	0.005956	0.006167	0.006361
12	0.004041	...	...	0.005756	0.005993	0.006021	0.006255	0.006466	0.006660
10	0.004427	...	...	0.006142	0.006279	0.006407	0.006641	0.006852	0.007046
8	0.004950	...	...	...	...	0.006930	0.007164	0.007375	0.007569
6	0.005715	...	...	...	...	...	...	0.008140	0.008334
5	0.006261	...	...	...	...	...	...	...	0.008880
4	0.007000	...	...	...	...	...	...	...	...
3	0.008083	...	...	...	...	...	...	...	...
2 1/2	0.008854	...	...	...	...	...	...	...	...
2	0.009899	...	...	...	...	...	...	...	...
1 1/2	0.011431	...	...	...	...	...	...	...	...
1 1/3	0.012124	...	...	...	...	...	...	...	...
1	0.014000	...	...	...	...	...	...	...	...
Diameter Increment, $0.0028\sqrt{D}$ → [Note (1)]		0.001400	0.001565	0.001715	0.001852	0.001980	0.002214	0.002425	0.002619

Threads/ in., n	Pitch Increment, $0.014\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]							
		1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2	2 1/4
16	0.003500	...	...	...	...	...	...	...	...
14	0.003742	0.006542	...	...	...	...	...	...	...
12	0.004041	0.006841	0.007011	0.007172	...	...	...	...	...
10	0.004427	0.007227	0.007397	0.007557	0.007710	0.007856	0.008131	...	...
8	0.004950	0.007750	0.007920	0.008080	0.008233	0.008379	0.008654	0.008910	...
6	0.005715	0.008515	0.008685	0.008845	0.008998	0.009144	0.009419	0.009675	0.009915
5	0.006261	0.009061	0.009231	0.009391	0.009544	0.009690	0.009965	0.010221	0.010461
4	0.007000	...	0.009970	0.010130	0.010283	0.010429	0.010704	0.010960	0.011200
3	0.008083	...	...	...	...	0.011512	0.011787	0.012043	0.012283
2 1/2	0.008854	...	...	...	...	...	0.012558	0.012814	0.013054
2	0.009899	...	...	...	...	...	...	0.013859	0.014099
1 1/2	0.011431	...	...	...	...	...	...	...	...
1 1/3	0.012124	...	...	...	...	...	...	...	...
1	0.014000	...	...	...	...	...	...	...	...
Diameter Increment, $0.0028\sqrt{D}$ → [Note (1)]		0.002800	0.002970	0.003130	0.003283	0.003429	0.003704	0.003960	0.004200

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TABLE 6 PITCH DIAMETER TOLERANCES FOR SINGLE-START ACME SCREW THREADS, CLASSES 3G AND 3C (CONT'D)

Threads/ in., *n*	Pitch Increment, $0.014\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]						
		2½	2¾	3	3½	4	4½	5
16	0.003500	...	...	...	...	...	...	...
14	0.003742	...	...	...	...	...	...	...
12	0.004041	...	...	...	...	...	...	...
10	0.004427	...	...	...	...	...	...	...
8	0.004950	...	...	...	...	...	...	...
6	0.005715	...	...	...	...	...	...	...
5	0.006261	0.010688	...	...	...	...	...	...
4	0.007000	0.011427	0.011643	0.011850	0.012238	0.012600	...	...
3	0.008083	0.012510	0.012726	0.012933	0.013321	0.013683	0.014023	0.014344
2½	0.008854	0.013281	0.013497	0.013704	0.014092	0.014454	0.014794	0.015115
2	0.009899	0.014326	0.014542	0.014749	0.015137	0.015499	0.015830	0.016160
1½	0.011431	...	...	0.016281	0.016669	0.017031	0.017371	0.017692
1⅓	0.012124	...	...	0.016974	0.017362	0.017724	0.018064	0.018385
1	0.014000	...	...	...	0.019238	0.019600	0.019940	0.020261
Diameter Increment, $0.0028\sqrt{D}$ ⟶ [Note (1)]		0.004427	0.004643	0.004850	0.005238	0.005600	0.005940	0.006261

GENERAL NOTE: The equivalent tolerance on thread thickness is 0.259 times the pitch diameter tolerance.

NOTES:
(1) The pitch diameter tolerances shown in this Table equal the sum of the pitch increment and the diameter increment.
(2) For an intermediate nominal diameter, apply the pitch diameter tolerance for the next larger nominal diameter given in this Table.

2.13 Allowances (Minimum Clearance) (*es*) for Pitch Diameter

Allowance applied to the pitch diameter of the external thread for Classes 2G, 3G, and 4G are based on the major diameter and are given in Table 9.

2.14 Limits of Size

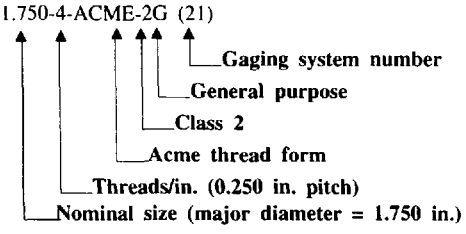
Limits of size for general purpose Acme threads of the standard series of diameters and pitches are given in Table 10. The application of these limits is illustrated in Fig. 3.

2.15 Thread Designations

The following abbreviations are recommended for use on drawings, specifications, and on tools and gages:

ACME	Acme threads
G	general purpose
L	lead
P	pitch
LH	left hand
(2_)	gaging system 21, 22, or 23, as defined in ASME B1.3M

2.15.1 Examples of Designations (Single- and Multiple-Start Threads)



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TABLE 7 PITCH DIAMETER TOLERANCES FOR SINGLE-START ACME SCREW THREADS, CLASSES 4G AND 4C

Threads/ in., *n*	Pitch Increment, $0.010\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]							
		1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8
16	0.002500	0.003500	0.003618	0.003725	0.003823	0.003914	0.004081	0.004232	...
14	0.002673	...	0.003791	0.003898	0.003996	0.004087	0.004254	0.004405	0.004544
12	0.002887	...	...	0.004112	0.004210	0.004301	0.004468	0.004619	0.004758
10	0.003162	...	...	0.004387	0.004485	0.004576	0.004743	0.004894	0.005033
8	0.003536	...	...	...	...	0.004950	0.005117	0.005268	0.005407
6	0.004082	...	...	...	...	...	...	0.005814	0.005953
5	0.004472	...	...	...	...	...	...	...	0.006343
4	0.005000	...	...	...	...	...	...	...	...
3	0.005774	...	...	...	...	...	...	...	...
2 1/2	0.006325	...	...	...	...	...	...	...	...
2	0.007071	...	...	...	...	...	...	...	...
1 1/2	0.008165	...	...	...	...	...	...	...	...
1 1/3	0.008660	...	...	...	...	...	...	...	...
1	0.010000	...	...	...	...	...	...	...	...
Diameter Increment, $0.002\sqrt{D}$ [Note (1)] →		0.001000	0.001118	0.001225	0.001323	0.001414	0.001581	0.001732	0.001871

Threads/ in., *n*	Pitch Increment, $0.010\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]							
		1	1 1/8	1 1/4	1 3/8	1 1/2	1 3/4	2	2 1/4
16	0.002500	...	...	...	...	...	...	...	...
14	0.002673	0.004673	...	...	...	...	...	...	...
12	0.002887	0.004887	0.005008	0.005123	...	...	...	...	...
10	0.003162	0.005162	0.005283	0.005398	0.005507	0.005612	0.005808	...	...
8	0.003536	0.005536	0.005657	0.005772	0.005881	0.005985	0.006182	0.006364	...
6	0.004082	0.006082	0.006203	0.006318	0.006427	0.006531	0.006728	0.006910	0.007082
5	0.004472	0.006472	0.006593	0.006708	0.006817	0.006921	0.007118	0.007300	0.007472
4	0.005000	...	0.007121	0.007236	0.007345	0.007449	0.007646	0.007828	0.008000
3	0.005774	...	...	...	...	0.008223	0.008420	0.008602	0.008774
2 1/2	0.006325	...	...	...	...	...	0.008971	0.009153	0.009325
2	0.007071	...	...	...	...	...	...	0.009899	0.010071
1 1/2	0.008165	...	...	...	...	...	...	...	...
1 1/3	0.008660	...	...	...	...	...	...	...	...
1	0.010000	...	...	...	...	...	...	...	...
Diameter Increment, $0.002\sqrt{D}$ [Note (1)] →		0.002000	0.002121	0.002236	0.002345	0.002449	0.002646	0.002828	0.003000

(continued)

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TABLE 7 PITCH DIAMETER TOLERANCES FOR SINGLE-START ACME SCREW THREADS, CLASSES 4G AND 4C (CONT'D)

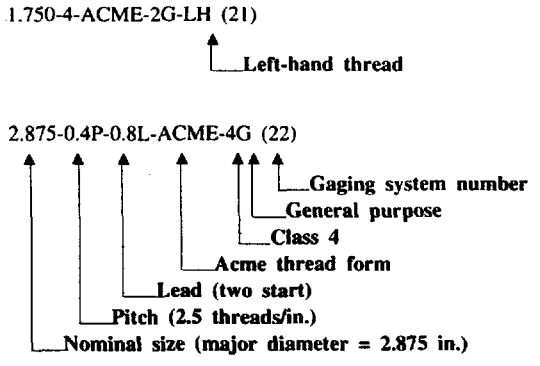
Threads/ in., n	Pitch Increment, $0.010\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]						
		$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5
16	0.002500	...	...	...	...	...	...	...
14	0.002673	...	...	...	...	...	...	...
12	0.002887	...	...	...	...	...	...	...
10	0.003162	...	...	...	...	...	...	...
8	0.003536	...	...	...	...	...	...	...
6	0.004082	...	...	...	...	...	...	...
5	0.004472	0.007634	...	...	...	...	...	...
4	0.005000	0.008162	0.008317	0.008464	0.008742	0.009000	...	...
3	0.005774	0.008936	0.009091	0.009238	0.009516	0.009774	0.010017	0.010246
$2\frac{1}{2}$	0.006325	0.009487	0.009642	0.009789	0.010067	0.010325	0.010568	0.010797
2	0.007071	0.010233	0.010388	0.010535	0.010813	0.011071	0.011314	0.011543
$1\frac{1}{2}$	0.008165	...	...	0.011629	0.011907	0.012165	0.012408	0.012637
$1\frac{1}{3}$	0.008660	...	...	0.012124	0.012402	0.012660	0.012903	0.013132
1	0.010000	...	...	...	0.013742	0.014000	0.014243	0.014472
Diameter Increment, $0.002\sqrt{D}$ → [Note (1)]		0.003162	0.003317	0.003464	0.003742	0.004000	0.004243	0.004472

GENERAL NOTE: The equivalent tolerance on thread thickness is 0.259 times the pitch diameter tolerance.

NOTES:

(1) The pitch diameter tolerances shown in this Table equal the sum of the pitch increment and the diameter increment.

(2) For an intermediate nominal diameter, apply the pitch diameter tolerance for the next larger nominal diameter given in this Table.



2.16 Formulas for Determining Diameters

Formulas follow for the basic, maximum, and minimum major, pitch, and minor diameters for external and internal threads of Classes 2G, 3G, and 4G with gage length not exceeding twice the basic major diameter.

2.16.1 Single-Start Threads

(a) External Threads

(1) Major diameter:

(Basic) maximum major diameter = nominal size or diameter D

$$d\ max. = d\ bsc = D\ bsc$$

Minimum major diameter = external maximum major diameter − Td (Table 4, column 4)

$$d\ min. = d\ bsc - Td$$

(2) Pitch diameter:

Maximum pitch diameter = internal minimum pitch diameter − allowance (Table 9, column 3, 4, or 5)

$$d_2\ max. = D_2\ min. - (es)$$

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TABLE 8 TOLERANCES ON 14.5 deg FLANK ANGLE FOR EXTERNAL AND INTERNAL PRODUCT THREADS

	14.5 deg Variation	
Threads/in.	deg	min
16	0	47
14	0	44
12	0	41
10	0	39
8	0	35
6	0	30
5	0	27
4	0	25
3	0	22
2.5	0	20
2	0	18
1.5	0	16
1.33	0	15
1	0	12

GENERAL NOTE:
Computed angle tolerances are from average pitch diameter tolerances for standard sizes and from 5 in. diameter size for pitches coarser than 2 threads/in. Pitch diameter tolerances are from Table 7.

Minimum pitch diameter = external maximum pitch diameter − Td_2 (Table 5, 6, or 7)

$$d_2\ min. = d_2\ max. - Td_2$$

(3) Minor diameter:

Maximum minor diameter = internal minimum minor diameter − allowance (Table 4, column 2)

$$d_1\ max. = D_1\ min. - (es)$$

Minimum minor diameter = external maximum minor diameter − Td_1 (Table 3, column 4)

$$d_1\ min. = d_1\ max. - Td_1$$

(b) Internal Thread

(1) Major diameter:

Minimum major diameter = external maximum major diameter + allowance (Table 4, column 2)

$$D\ min. = D\ bsc + (EI)$$

Maximum major diameter = internal minimum major diameter + TD (Table 4)

$$D\ max. = D\ min. + TD$$

(2) Pitch diameter:

(Basic) minimum pitch diameter = external maximum major diameter − $P/2$

$$D_2\ min. = d\ bsc - P/2$$

Maximum pitch diameter = internal minimum pitch diameter + TD_2 (Table 5, 6, or 7)

$$D_2\ max. = D_2\ min. + TD_2$$

(3) Minor diameter:

(Basic) minimum minor diameter = external maximum major diameter − P

$$D_1\ min. = d\ max. - P$$

Maximum minor diameter = internal minimum minor diameter + TD_1 (Table 4, column 3)

$$D_1\ max. = D_1\ min. + TD_1$$

2.17 Maximum-Material Profile Option

In the case of manufacture by rolling, the external thread profile at the minor diameter may be modified in order to obtain a larger rounding on the root of the thread. The maximum minor diameter, $d_3\ max.$, of the external thread may in this case be reduced by $0.15P$.

If this profile modification is necessary, due to the particular method of manufacture, it must be agreed upon by the purchaser and the supplier.

3 SPECIFICATIONS FOR CENTRALIZING ACME SCREW THREADS

3.1 Angle of Thread

The included angle between the flanks of the thread, measured in an axial plane, shall be 29 deg. The line bisecting this 29 deg angle shall be perpendicular to the axis of the screw thread.

3.2 Pitch and Lead of Thread

The pitch of the thread is the distance, measured parallel to its axis, between corresponding points on adjacent thread forms. The lead of a thread is the distance traversed in one revolution of a screw thread.

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TABLE 9 EXTERNAL PITCH DIAMETER ALLOWANCES (*es*) FOR SINGLE-START ACME SCREW THREADS

Nominal Size Range [Note (1)]		Allowances on External Threads [Note (2)]		
Above	To and Including	Classes 2G and 2C, $0.008\sqrt{D}$	Classes 3G and 3C, $0.006\sqrt{D}$	Classes 4G and 4C, $0.004\sqrt{D}$
0	3/16	0.0024	0.0018	0.0012
3/16	5/16	0.0040	0.0030	0.0020
5/16	7/16	0.0049	0.0037	0.0024
7/16	9/16	0.0057	0.0042	0.0028
9/16	11/16	0.0063	0.0047	0.0032
11/16	13/16	0.0069	0.0052	0.0035
13/16	15/16	0.0075	0.0056	0.0037
15/16	1 1/16	0.0080	0.0060	0.0040
1 1/16	1 3/16	0.0085	0.0064	0.0042
1 3/16	1 5/16	0.0089	0.0067	0.0045
1 5/16	1 7/16	0.0094	0.0070	0.0047
1 7/16	1 9/16	0.0098	0.0073	0.0049
1 9/16	1 7/8	0.0105	0.0079	0.0052
1 7/8	2 1/8	0.0113	0.0085	0.0057
2 1/8	2 3/8	0.0120	0.0090	0.0060
2 3/8	2 5/8	0.0126	0.0095	0.0063
2 5/8	2 7/8	0.0133	0.0099	0.0066
2 7/8	3 1/4	0.0140	0.0105	0.0070
3 1/4	3 3/4	0.0150	0.0112	0.0075
3 3/4	4 1/4	0.0160	0.0120	0.0080
4 1/4	4 3/4	0.0170	0.0127	0.0085
4 3/4	5 1/2	0.0181	0.0136	0.0091

GENERAL NOTES:
(a) This Table is used to increase the percentage of tolerance for size of internal major, pitch, and minor diameters for multiple-start threads.
(b) Allowances on pitch diameter of external threads provide a minimum clearance on assemblies.

NOTES:
(1) The values in the third through fifth columns are to be used for any size within the range shown in the first and second columns. These values are calculated from the mean of the range.
(2) An increase of 10% in the allowance is recommended for each inch, or fraction thereof, that the length of engagement exceeds two diameters.

On multiple-start threads, the lead equals pitch multiplied by the number of starts.

3.3 Height of Thread

The basic height of the thread is equal to one-half of the pitch.

3.4 Thickness of Thread

The basic thickness of the thread profile at the pitch line is one-half of the pitch.

3.5 Allowance (Minimum Clearance) at Major and Minor Diameters

A minimum diametral clearance is provided at the minor diameter of all external threads by establishing the maximum minor diameter 0.020 in. less than the basic minor diameter for 10 threads/in. and coarser, and 0.010 in. less for finer pitches, and establishing the minimum minor diameter of the internal thread $0.1P$ greater than the basic minor diameter.

A minimum diametral clearance at the major diameter is obtained by establishing the minimum major diameter

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TABLE 10 LIMITING DIMENSIONS AND TOLERANCES FOR GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G

	External							Internal						
	Major Diameter		Pitch Diameter			Minor Diameter		Minor Diameter		Pitch Diameter			Major Diameter	
Designation	Max.	Min.	Max.	Min.	Tolerance	Max.	Min.	Min.	Max.	Min.	Max.	Tolerance	Min.	Max.
0.2500-16.0 ACME-2G	0.2500	0.2450	0.2148	0.2043	0.0105	0.1775	0.1618	0.1875	0.1925	0.2188	0.2293	0.0105	0.2600	0.2700
0.2500-16.0 ACME-3G	0.2500	0.2450	0.2158	0.2109	0.0049	0.1775	0.1701	0.1875	0.1925	0.2188	0.2237	0.0049	0.2600	0.2700
0.2500-16.0 ACME-4G	0.2500	0.2450	0.2168	0.2133	0.0035	0.1775	0.1723	0.1875	0.1925	0.2188	0.2223	0.0035	0.2600	0.2700
0.3125-14.0 ACME-2G	0.3125	0.3075	0.2728	0.2614	0.0114	0.2311	0.2140	0.2411	0.2461	0.2768	0.2882	0.0114	0.3225	0.3325
0.3125-14.0 ACME-3G	0.3125	0.3075	0.2738	0.2685	0.0053	0.2311	0.2231	0.2411	0.2461	0.2768	0.2821	0.0053	0.3225	0.3325
0.3125-14.0 ACME-4G	0.3125	0.3075	0.2748	0.2710	0.0038	0.2311	0.2254	0.2411	0.2461	0.2768	0.2806	0.0038	0.3225	0.3325
0.3750-12.0 ACME-2G	0.3750	0.3700	0.3284	0.3161	0.0123	0.2817	0.2632	0.2917	0.2967	0.3333	0.3456	0.0123	0.3850	0.3950
0.3750-12.0 ACME-3G	0.3750	0.3700	0.3296	0.3238	0.0058	0.2817	0.2731	0.2917	0.2967	0.3333	0.3391	0.0058	0.3850	0.3950
0.3750-12.0 ACME-4G	0.3750	0.3700	0.3309	0.3268	0.0041	0.2817	0.2755	0.2917	0.2967	0.3333	0.3374	0.0041	0.3850	0.3950
0.4375-12.0 ACME-2G	0.4375	0.4325	0.3909	0.3783	0.0126	0.3442	0.3253	0.3542	0.3592	0.3958	0.4084	0.0126	0.4475	0.4575
0.4375-12.0 ACME-3G	0.4375	0.4325	0.3921	0.3862	0.0059	0.3442	0.3354	0.3542	0.3592	0.3958	0.4017	0.0059	0.4475	0.4575
0.4375-12.0 ACME-4G	0.4375	0.4325	0.3934	0.3892	0.0042	0.3442	0.3379	0.3542	0.3592	0.3958	0.4000	0.0042	0.4475	0.4575
0.5000-10.0 ACME-2G	0.5000	0.4950	0.4443	0.4306	0.0137	0.3800	0.3594	0.4000	0.4050	0.4500	0.4637	0.0137	0.5200	0.5400
0.5000-10.0 ACME-3G	0.5000	0.4950	0.4458	0.4394	0.0064	0.3800	0.3704	0.4000	0.4050	0.4500	0.4564	0.0064	0.5200	0.5400
0.5000-10.0 ACME-4G	0.5000	0.4950	0.4472	0.4426	0.0046	0.3800	0.3731	0.4000	0.4050	0.4500	0.4546	0.0046	0.5200	0.5400
0.6250-8.0 ACME-2G	0.6250	0.6188	0.5562	0.5408	0.0154	0.4800	0.4570	0.5000	0.5062	0.5625	0.5779	0.0154	0.6450	0.6650
0.6250-8.0 ACME-3G	0.6250	0.6188	0.5578	0.5506	0.0072	0.4800	0.4693	0.5000	0.5062	0.5625	0.5697	0.0072	0.6450	0.6650
0.6250-8.0 ACME-4G	0.6250	0.6188	0.5593	0.5542	0.0051	0.4800	0.4723	0.5000	0.5062	0.5625	0.5676	0.0051	0.6450	0.6650
0.7500-6.0 ACME-2G	0.7500	0.7417	0.6598	0.6424	0.0174	0.5633	0.5371	0.5833	0.5916	0.6667	0.6841	0.0174	0.7700	0.7900
0.7500-6.0 ACME-3G	0.7500	0.7417	0.6615	0.6534	0.0081	0.5633	0.5511	0.5833	0.5916	0.6667	0.6748	0.0081	0.7700	0.7900
0.7500-6.0 ACME-4G	0.7500	0.7417	0.6632	0.6574	0.0058	0.5633	0.5546	0.5833	0.5916	0.6667	0.6725	0.0058	0.7700	0.7900
0.8750-6.0 ACME-2G	0.8750	0.8667	0.7842	0.7663	0.0179	0.6883	0.6615	0.7083	0.7166	0.7917	0.8096	0.0179	0.8950	0.9150
0.8750-6.0 ACME-3G	0.8750	0.8667	0.7861	0.7778	0.0083	0.6883	0.6758	0.7083	0.7166	0.7917	0.8000	0.0083	0.8950	0.9150
0.8750-6.0 ACME-4G	0.8750	0.8667	0.7880	0.7820	0.0060	0.6883	0.6794	0.7083	0.7166	0.7917	0.7977	0.0060	0.8950	0.9150
1.0000-5.0 ACME-2G	1.0000	0.9900	0.8920	0.8726	0.0194	0.7800	0.7509	0.8000	0.8100	0.9000	0.9194	0.0194	1.0200	1.0400
1.0000-5.0 ACME-3G	1.0000	0.9900	0.8940	0.8849	0.0091	0.7800	0.7664	0.8000	0.8100	0.9000	0.9091	0.0091	1.0200	1.0400
1.0000-5.0 ACME-4G	1.0000	0.9900	0.8960	0.8895	0.0065	0.7800	0.7703	0.8000	0.8100	0.9000	0.9065	0.0065	1.0200	1.0400

(continued)

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TABLE 10 LIMITING DIMENSIONS AND TOLERANCES FOR GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G (CONT'D)

	External							Internal						
	Major Diameter		Pitch Diameter			Minor Diameter		Minor Diameter		Pitch Diameter			Major Diameter	
Designation	Max.	Min.	Max.	Min.	Tolerance	Max.	Min.	Min.	Max.	Min.	Max.	Tolerance	Min.	Max.
1.1250-5.0 ACME-2G	1.1250	1.1150	1.0165	0.9967	0.0198	0.9050	0.8753	0.9250	0.9350	1.0250	1.0448	0.0198	1.1450	1.1650
1.1250-5.0 ACME-3G	1.1250	1.1150	1.0186	1.0094	0.0092	0.9050	0.8912	0.9250	0.9350	1.0250	1.0342	0.0092	1.1450	1.1650
1.1250-5.0 ACME-4G	1.1250	1.1150	1.0208	1.0142	0.0066	0.9050	0.8951	0.9250	0.9350	1.0250	1.0316	0.0066	1.1450	1.1650
1.2500-5.0 ACME-2G	1.2500	1.2400	1.1411	1.1210	0.0201	1.0300	0.9998	1.0500	1.0600	1.1500	1.1701	0.0201	1.2700	1.2900
1.2500-5.0 ACME-3G	1.2500	1.2400	1.1433	1.1339	0.0094	1.0300	1.0159	1.0500	1.0600	1.1500	1.1594	0.0094	1.2700	1.2900
1.2500-5.0 ACME-4G	1.2500	1.2400	1.1455	1.1388	0.0067	1.0300	1.0199	1.0500	1.0600	1.1500	1.1567	0.0067	1.2700	1.2900
1.3750-4.0 ACME-2G	1.3750	1.3625	1.2406	1.2186	0.0220	1.1050	1.0719	1.1250	1.1375	1.2500	1.2720	0.0220	1.3950	1.4150
1.3750-4.0 ACME-3G	1.3750	1.3625	1.2430	1.2327	0.0103	1.1050	1.0896	1.1250	1.1375	1.2500	1.2603	0.0103	1.3950	1.4150
1.3750-4.0 ACME-4G	1.3750	1.3625	1.2453	1.2380	0.0073	1.1050	1.0940	1.1250	1.1375	1.2500	1.2573	0.0073	1.3950	1.4150
1.5000-4.0 ACME-2G	1.5000	1.4875	1.3652	1.3429	0.0223	1.2300	1.1965	1.2500	1.2625	1.3750	1.3973	0.0223	1.5200	1.5400
1.5000-4.0 ACME-3G	1.5000	1.4875	1.3677	1.3573	0.0104	1.2300	1.2144	1.2500	1.2625	1.3750	1.3854	0.0104	1.5200	1.5400
1.5000-4.0 ACME-4G	1.5000	1.4875	1.3701	1.3627	0.0074	1.2300	1.2188	1.2500	1.2625	1.3750	1.3824	0.0074	1.5200	1.5400
1.7500-4.0 ACME-2G	1.7500	1.7375	1.6145	1.5916	0.0229	1.4800	1.4456	1.5000	1.5125	1.6250	1.6479	0.0229	1.7700	1.7900
1.7500-4.0 ACME-3G	1.7500	1.7375	1.6171	1.6064	0.0107	1.4800	1.4639	1.5000	1.5125	1.6250	1.6357	0.0107	1.7700	1.7900
1.7500-4.0 ACME-4G	1.7500	1.7375	1.6198	1.6122	0.0076	1.4800	1.4685	1.5000	1.5125	1.6250	1.6326	0.0076	1.7700	1.7900
2.0000-4.0 ACME-2G	2.0000	1.9875	1.8637	1.8402	0.0235	1.7300	1.6948	1.7500	1.7625	1.8750	1.8985	0.0235	2.0200	2.0400
2.0000-4.0 ACME-3G	2.0000	1.9875	1.8665	1.8555	0.0110	1.7300	1.7136	1.7500	1.7625	1.8750	1.8860	0.0110	2.0200	2.0400
2.0000-4.0 ACME-4G	2.0000	1.9875	1.8693	1.8615	0.0078	1.7300	1.7183	1.7500	1.7625	1.8750	1.8828	0.0078	2.0200	2.0400
2.2500-3.0 ACME-2G	2.2500	2.2333	2.0713	2.0450	0.0263	1.8967	1.8572	1.9167	1.9334	2.0833	2.1096	0.0263	2.2700	2.2900
2.2500-3.0 ACME-3G	2.2500	2.2333	2.0743	2.0620	0.0123	1.8967	1.8783	1.9167	1.9334	2.0833	2.0956	0.0123	2.2700	2.2900
2.2500-3.0 ACME-4G	2.2500	2.2333	2.0773	2.0685	0.0088	1.8967	1.8835	1.9167	1.9334	2.0833	2.0921	0.0088	2.2700	2.2900
2.5000-3.0 ACME-2G	2.5000	2.4833	2.3207	2.2939	0.0268	2.1467	2.1065	2.1667	2.1834	2.3333	2.3601	0.0268	2.5200	2.5400
2.5000-3.0 ACME-3G	2.5000	2.4833	2.3238	2.3113	0.0125	2.1467	2.1279	2.1667	2.1834	2.3333	2.3458	0.0125	2.5200	2.5400
2.5000-3.0 ACME-4G	2.5000	2.4833	2.3270	2.3181	0.0089	2.1467	2.1333	2.1667	2.1834	2.3333	2.3422	0.0089	2.5200	2.5400
2.7500-3.0 ACME-2G	2.7500	2.7333	2.5700	2.5427	0.0273	2.3967	2.3558	2.4167	2.4334	2.5833	2.6106	0.0273	2.7700	2.7900
2.7500-3.0 ACME-3G	2.7500	2.7333	2.5734	2.5607	0.0127	2.3967	2.3776	2.4167	2.4334	2.5833	2.5960	0.0127	2.7700	2.7900
2.7500-3.0 ACME-4G	2.7500	2.7333	2.5767	2.5676	0.0091	2.3967	2.3831	2.4167	2.4334	2.5833	2.5924	0.0091	2.7700	2.7900

(continued)

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TABLE 10 LIMITING DIMENSIONS AND TOLERANCES FOR GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G (CONT'D)

	External							Internal						
	Major Diameter		Pitch Diameter			Minor Diameter		Minor Diameter		Pitch Diameter			Major Diameter	
Designation	Max.	Min.	Max.	Min.	Tolerance	Max.	Min.	Min.	Max.	Min.	Max.	Tolerance	Min.	Max.
3.0000-2.0 ACME-2G	3.0000	2.9750	2.7360	2.7044	0.0316	2.4800	2.4326	2.5000	2.5250	2.7500	2.7816	0.0316	3.0200	3.0400
3.0000-2.0 ACME-3G	3.0000	2.9750	2.7395	2.7248	0.0147	2.4800	2.4579	2.5000	2.5250	2.7500	2.7647	0.0147	3.0200	3.0400
3.0000-2.0 ACME-4G	3.0000	2.9750	2.7430	2.7325	0.0105	2.4800	2.4642	2.5000	2.5250	2.7500	2.7605	0.0105	3.0200	3.0400
3.5000-2.0 ACME-2G	3.5000	3.4750	3.2350	3.2026	0.0324	2.9800	2.9313	3.0000	3.0250	3.2500	3.2824	0.0324	3.5200	3.5400
3.5000-2.0 ACME-3G	3.5000	3.4750	3.2388	3.2237	0.0151	2.9800	2.9573	3.0000	3.0250	3.2500	3.2651	0.0151	3.5200	3.5400
3.5000-2.0 ACME-4G	3.5000	3.4750	3.2425	3.2317	0.0108	2.9800	2.9638	3.0000	3.0250	3.2500	3.2608	0.0108	3.5200	3.5400
4.0000-2.0 ACME-2G	4.0000	3.9750	3.7340	3.7008	0.0332	3.4800	3.4302	3.5000	3.5250	3.7500	3.7832	0.0332	4.0200	4.0400
4.0000-2.0 ACME-3G	4.0000	3.9750	3.7380	3.7225	0.0155	3.4800	3.4568	3.5000	3.5250	3.7500	3.7655	0.0155	4.0200	4.0400
4.0000-2.0 ACME-4G	4.0000	3.9750	3.7420	3.7309	0.0111	3.4800	3.4634	3.5000	3.5250	3.7500	3.7611	0.0111	4.0200	4.0400
4.5000-2.0 ACME-2G	4.5000	4.4750	4.2330	4.1991	0.0339	3.9800	3.9291	4.0000	4.0250	4.2500	4.2839	0.0339	4.5200	4.5400
4.5000-2.0 ACME-3G	4.5000	4.4750	4.2373	4.2215	0.0158	3.9800	3.9562	4.0000	4.0250	4.2500	4.2658	0.0158	4.5200	4.5400
4.5000-2.0 ACME-4G	4.5000	4.4750	4.2415	4.2302	0.0113	3.9800	3.9630	4.0000	4.0250	4.2500	4.2613	0.0113	4.5200	4.5400
5.0000-2.0 ACME-2G	5.0000	4.9750	4.7319	4.6973	0.0346	4.4800	4.4281	4.5000	4.5250	4.7500	4.7846	0.0346	5.0200	5.0400
5.0000-2.0 ACME-3G	5.0000	4.9750	4.7364	4.7202	0.0162	4.4800	4.4558	4.5000	4.5250	4.7500	4.7662	0.0162	5.0200	5.0400
5.0000-2.0 ACME-4G	5.0000	4.9750	4.7409	4.7294	0.0115	4.4800	4.4627	4.5000	4.5250	4.7500	4.7615	0.0115	5.0200	5.0400

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TABLE 11 CENTRALIZING ACME SCREW THREAD FORM, BASIC DIMENSIONS

Threads/ in., *n*	Pitch, *P*	Height of Thread (Basic), $h = P/2$	Total Height of Thread (All External Threads), $h_s = h + \frac{1}{2}$ Allowance [Note (1)]	Thread Thickness (Basic), $t = P/2$	45 deg Chamfer Crest of Centralizing External Threads		Max. Fillet Radius at Root of Centralizing Tapped Hole, 0.06 *P*	Max. Fillet Radius at Minor Diameter of Centralizing Screws, All Classes, 0.10 *P*
					Min. Depth, 0.05 *P*	Min. Width of Chamfer Flat, 0.0707 *P*		
16	0.06250	0.03125	0.0362	0.03125	0.0031	0.0044	0.0038	0.0062
14	0.07143	0.03571	0.0407	0.03571	0.0036	0.0050	0.0038	0.0071
12	0.08333	0.04167	0.0467	0.04167	0.0042	0.0059	0.0050	0.0083
10	0.10000	0.05000	0.0600	0.05000	0.0050	0.0071	0.0060	0.0100
8	0.12500	0.06250	0.0725	0.06250	0.0062	0.0088	0.0075	0.0125
6	0.16667	0.08333	0.0933	0.08333	0.0083	0.0119	0.0100	0.0167
5	0.20000	0.10000	0.1100	0.10000	0.0100	0.0141	0.0120	0.0200
4	0.25000	0.12500	0.1350	0.12500	0.0125	0.0177	0.0150	0.0250
3	0.33333	0.16667	0.1767	0.16667	0.0167	0.0236	0.0200	0.0333
2½	0.40000	0.20000	0.2100	0.20000	0.0200	0.0283	0.0240	0.0400
2	0.50000	0.25000	0.2600	0.25000	0.0250	0.0354	0.0300	0.0500
1½	0.66667	0.33333	0.3433	0.33333	0.0330	0.0471	0.0400	0.0667
1⅓	0.75000	0.37500	0.3850	0.37500	0.0380	0.0530	0.0450	0.0750
1	1.00000	0.50000	0.5100	0.50000	0.0500	0.0707	0.0600	0.1000

NOTE:
(1) Allowance shown in Table 15.

of the internal thread $0.001\sqrt{D}$ in. greater than the basic major diameter.

3.6 Chamfers and Fillets

External threads shall have the crest corners chamfered at an angle of 45 deg with the axis to a minimum depth of $P/20$. This corresponds to a minimum width of chamfer flat of $0.0707P$ and a maximum width of $0.0945P$. (See Table 11, columns 6 and 7.)

External threads may have a fillet at the minor diameter not greater than $0.1P$.

The internal thread may have an optional fillet. (See Fig. 5.)

3.7 Basic Thread Form Dimensions

The basic dimensions of the centralizing Acme thread form for the most generally used pitches are given in Table 11. The basic thread profile is symmetrical and is illustrated in Fig. 1. Design profiles are shown in Fig. 4.

3.8 Standard Centralizing Acme Thread Series

A selected series of diameters and associated pitches of Acme threads, listed in Table 15, are recommended as preferred. These diameters and pitches have been carefully selected to meet present needs with the fewest number of items in order to reduce to a minimum the inventory of both tools and gages. If other combinations of diameter and pitch are required, calculate thread dimensions in accordance with formulas in para. 2.16 and Tables in Appendix H for sizes over 5 in.

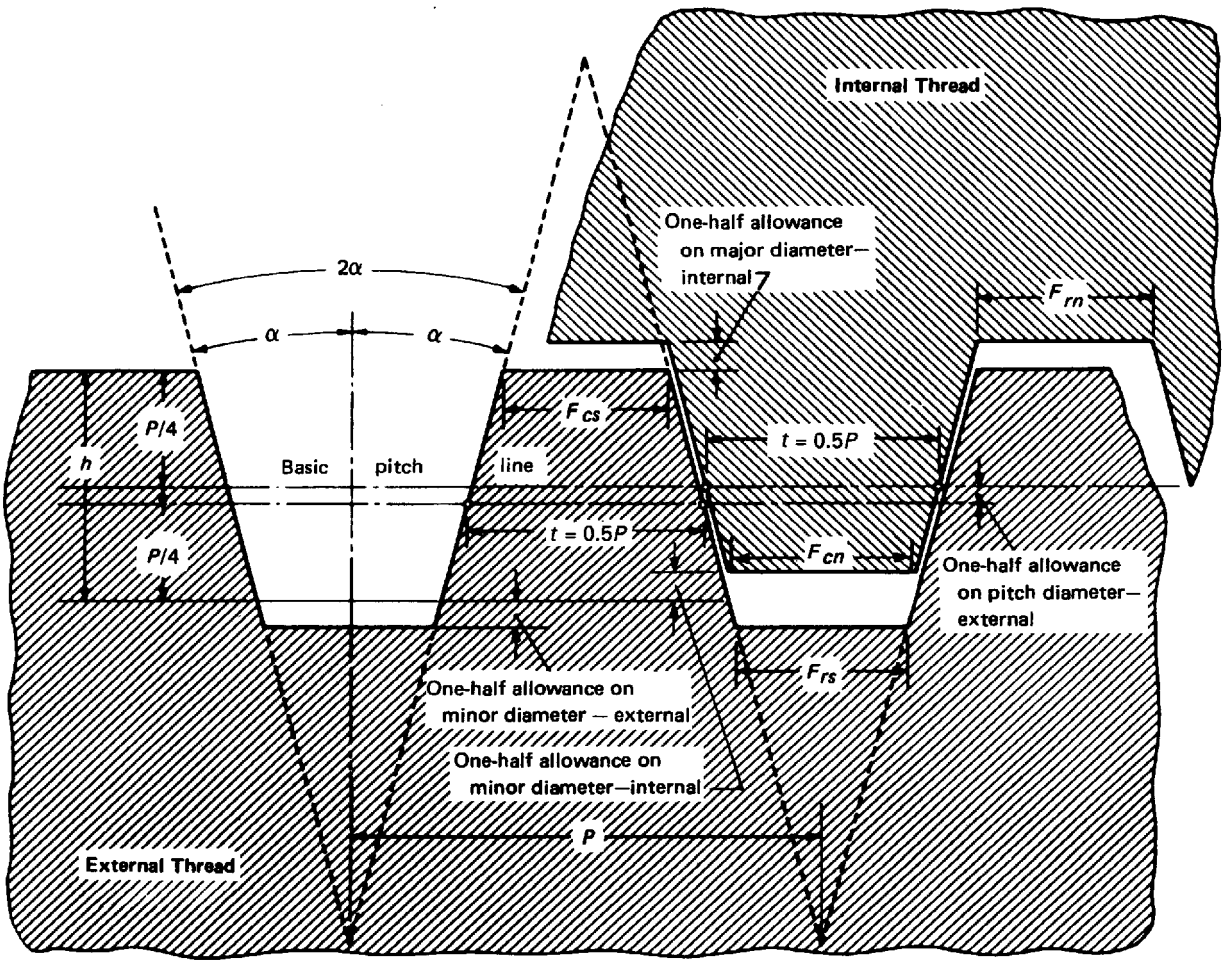
3.9 Classification and Tolerances, Centralizing Acme Threads

There are established herein three classes of threads for centralizing Acme threads 2C, 3C, and 4C.

These classes, together with the accompanying specifications, are for the purpose of ensuring interchangeable manufacture of Acme threaded parts. Each user is free to select the classes best adapted to his particular needs.

It is suggested that external and internal threads of the same class be used together for centralizing assemblies, Class 2C providing the maximum end play or backlash. If less backlash or end play is desired, Classes 3C and 4C are provided. The requirement for a centralizing fit is that the sum of the major diameter tolerance plus the major diameter allowance on the internal thread, and the major diameter tolerance on the external thread, shall equal or be less than the pitch diameter allowance on the external thread.

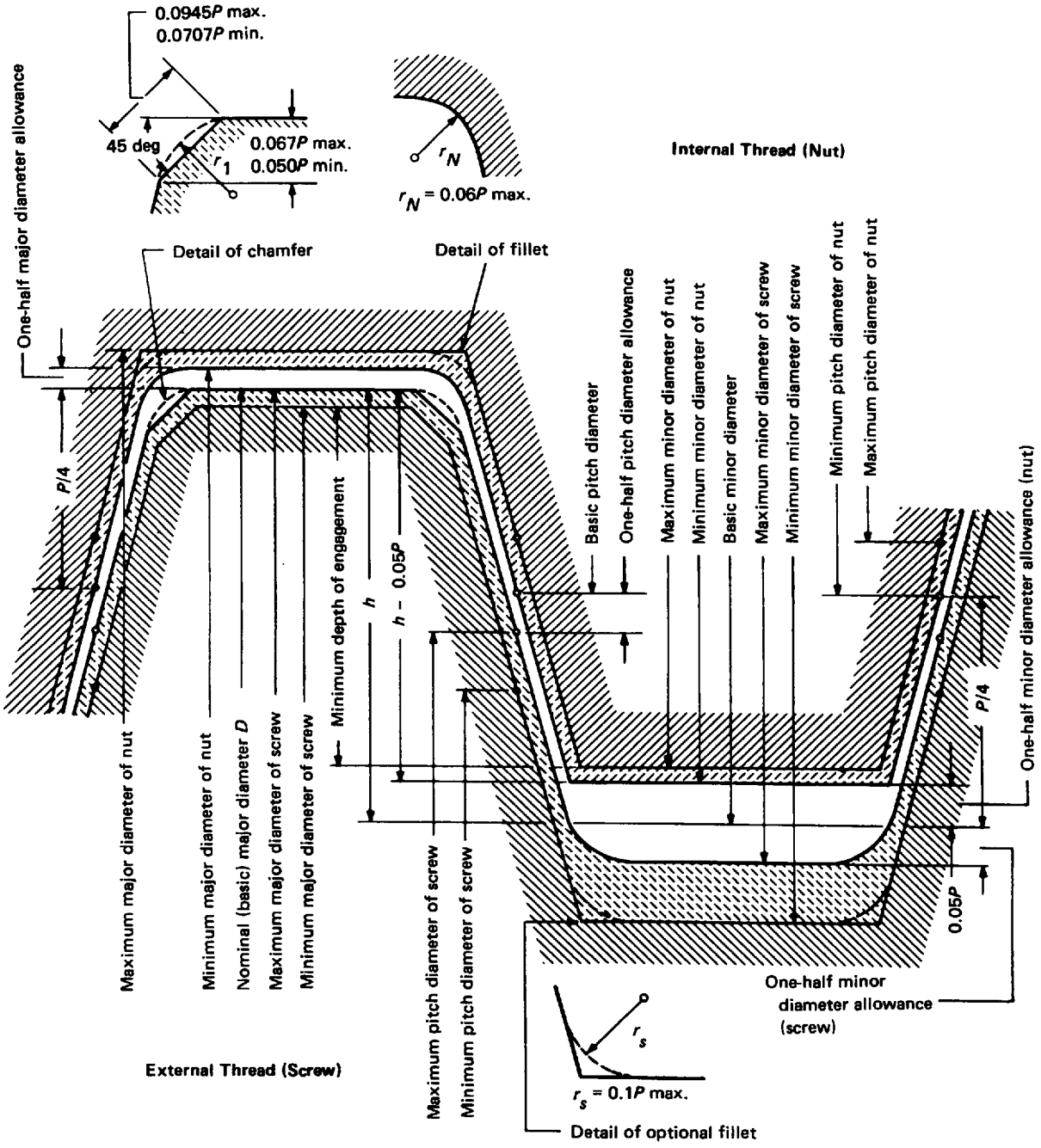
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F_{cn} = width of flat of crest of internal thread
= 0.3707P + 0.259 X (minor diameter allowance on internal threads)
F_{cs} = width of flat of crest of external thread
= 0.3707P − 0.259 (pitch diameter allowance on external thread)
F_{rn} = 0.3707P − 0.259 X (major diameter allowance on internal thread)
F_{rs} = 0.3707P − 0.259 X (minor diameter allowance on external thread − pitch diameter allowance on external thread)
P = pitch
h = basic height of thread
= $P/2$
n = number of threads/in.
α = 14 deg 30 min
2α = 29 deg

FIG. 4 DESIGN PROFILE FOR EXTERNAL AND INTERNAL CENTRALIZING ACME THREAD

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P = pitch
h = basic thread height

FIG. 5 DISPOSITION OF ALLOWANCES, TOLERANCES, AND CREST CLEARANCES FOR CENTRALIZING SINGLE-START ACME THREADS, CLASSES 2C, 3C, AND 4C

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TABLE 12 CENTRALIZING ACME SINGLE-START SCREW THREADS, BASIC DIAMETERS AND THREAD DATA

Nominal Sizes, All Classes	Threads/ in., n	Centralizing Classes 2C, 3C, and 4C: Basic Major Diameter, D	Pitch Diameter, $D_2 = D - h$	Minor Diameter, $D_1 = D - 2h$	Pitch, P	Thickness at Pitch Line, $t = P/2$	Basic Height of Thread, $h = P/2$	Basic Width of Flat, $F = 0.3707\,P$	Lead Angle at Basic Pitch Diameter: Centralizing Classes 2C, 3C, and 4C, λ deg	min
1/4	16	0.2500	0.2188	0.1875	0.06250	0.03125	0.03125	0.0232	5	12
5/16	14	0.3125	0.2768	0.2411	0.07143	0.03571	0.03571	0.0265	4	42
3/8	12	0.3750	0.3333	0.2917	0.08333	0.04167	0.04167	0.0309	4	33
7/16	12	0.4375	0.3958	0.3542	0.08333	0.04167	0.04167	0.0309	3	50
1/2	10	0.5000	0.4500	0.4000	0.10000	0.05000	0.05000	0.0371	4	3
5/8	8	0.6250	0.5625	0.5000	0.12500	0.06250	0.06250	0.0463	4	3
3/4	6	0.7500	0.6667	0.5833	0.16667	0.08333	0.08333	0.0618	4	33
7/8	6	0.8750	0.7917	0.7083	0.16667	0.08333	0.08333	0.0618	3	50
1	5	1.0000	0.9000	0.8000	0.20000	0.10000	0.10000	0.0741	4	3
1 1/8	5	1.1250	1.0250	0.9250	0.20000	0.10000	0.10000	0.0741	3	33
1 1/4	5	1.2500	1.1500	1.0500	0.20000	0.10000	0.10000	0.0741	3	10
1 3/8	4	1.3750	1.2500	1.1250	0.25000	0.12500	0.12500	0.0927	3	39
1 1/2	4	1.5000	1.3750	1.2500	0.25000	0.12500	0.12500	0.0927	3	19
1 3/4	4	1.7500	1.6250	1.5000	0.25000	0.12500	0.12500	0.0927	2	48
2	4	2.0000	1.8750	1.7500	0.25000	0.12500	0.12500	0.0927	2	26
2 1/4	3	2.2500	2.0833	1.9167	0.33333	0.16667	0.16667	0.1236	2	55
2 1/2	3	2.5000	2.3333	2.1667	0.33333	0.16667	0.16667	0.1236	2	36
2 3/4	3	2.7500	2.5833	2.4167	0.33333	0.16667	0.16667	0.1236	2	21
3	2	3.0000	2.7500	2.5000	0.50000	0.25000	0.25000	0.1853	3	19
3 1/2	2	3.5000	3.2500	3.0000	0.50000	0.25000	0.25000	0.1853	2	48
4	2	4.0000	3.7500	3.5000	0.50000	0.25000	0.25000	0.1853	2	26
4 1/2	2	4.5000	4.2500	4.0000	0.50000	0.25000	0.25000	0.1853	2	9
5	2	5.0000	4.7500	4.5000	0.50000	0.25000	0.25000	0.1853	1	55

A Class 2C external thread, which has a larger pitch diameter allowance than either a Class 3C or 4C, can be used interchangeably with Class 2C, 3C, or 4C internal thread and fulfill this requirement. Similarly, a Class 3C external thread can be used interchangeably with a Class 3C or 4C internal thread, but only a Class 4C internal thread can be used with a Class 4C external thread. For sizes over 5 in., see Table H1.

3.10 Basic Diameters

The maximum major diameter of the external thread is basic and is the nominal size for all classes. The minimum pitch diameter of the internal thread is basic for all classes and equal to the basic major diameter minus the basic thread height. The minimum minor diameter of the internal thread for all Classes is $0.1P$ above basic. Basic minor diameter is equal to basic major diameter minus twice the basic thread height. (See Fig. 5 and Table 12.)

3.11 Length of Engagement

The tolerances specified herein are applicable to all lengths of engagement not exceeding twice the nominal major diameter.

3.12 Tolerances

3.12.1 Tolerance Zone Definition. The definition of the centralizing Acme thread is dimensioned by pitch diameter reference locations in perfect 29 deg thread forms with crest and root limited by the corresponding major and minor diameters with corner fillet

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TABLE 13 TOLERANCES ON MAJOR AND MINOR DIAMETERS OF SINGLE-START CENTRALIZING EXTERNAL AND INTERNAL THREADS

Type of Thread		Major Diameter		Minor Diameter	
		External Thread	Internal Thread	External Thread	Internal Thread
Centralizing	Class 2C	$0.0035\sqrt{D}$	$0.0035\sqrt{D}$	1.5 × pitch diameter tolerance	$0.05P$ [Note (1)] (min. = 0.005 in.)
	Class 3C	$0.0015\sqrt{D}$	$0.0035\sqrt{D}$		
	Class 4C	$0.0010\sqrt{D}$	$0.0020\sqrt{D}$		

NOTE:
(1) To avoid a complicated formula and still provide an adequate tolerance, the pitch factor is used as a base with the minimum tolerance value set at 0.005 in.

limitations. This tolerance zone between the maximum and minimum thread profiles defines the thread. There are additional limitations, within the tolerance zone, on the element's flank angle and lead.

3.12.2 Tolerance Direction. The tolerances on diameters of the internal thread are plus, being applied from the minimum sizes to above the minimum sizes.

The tolerances on diameters of the external threads are minus, being applied from the maximum sizes to below the maximum sizes.

3.12.3 Tolerances on Major and Minor Diameters. The tolerances on major and minor diameters of external and internal threads are based on the data in Table 13; the values are listed in Table 14.

3.12.4 Tolerances on Pitch Diameter. The pitch diameter tolerances for an external and internal thread of a given class are the same. These tolerances determine the tolerance zone included between the maximum and minimum boundary limits. The tolerance Classes 2C, 3C, and 4C are given in Tables 5, 6, and 7. The ratios of the pitch diameter tolerance of Classes 2C, 3C, and 4C are 3.0, 1.4, and 1, respectively. Pitch diameter tolerance is equal to the pitch increment plus the diameter increment.

$$\text{Class 2C pitch diameter tolerance} = 0.030\sqrt{P} + 0.006\sqrt{D}$$
$$\text{Class 3C pitch diameter tolerance} = 0.014\sqrt{P} + 0.0028\sqrt{D}$$
$$\text{Class 4C pitch diameter tolerance} = 0.010\sqrt{P} + 0.002\sqrt{D}$$

where

D = nominal major diameter
P = pitch

Pitch diameter tolerance on product threads includes the effects of all variations in thread form and profile including lead (helix), flank angle, taper, and roundness. When gaged with Go/Not Go limit gaging per this Standard, the functional diameter/size is controlled within these limits over the length of engagement.

3.12.5 Tolerance on Lead. When measurement is specified, the allowable lead variation shall not exceed 0.258618 times one-half the pitch diameter tolerance for Classes 4G and 4C. For multiple-start threads, see para. 5.1.3 or para. 4.4.3 and Appendix B.

3.12.6 Tolerance on 14.5 deg Flank Angle. When measurement is specified, the allowable variation is given in Table 8. These values apply to all classes. They approximate a change in functional diameter close to one-half the 4G pitch diameter tolerance. The pitch diameter equivalent was calculated as follows: approximately $0.018P$ times sum of the two flank angle variations in degrees, regardless of sign.

Tolerances for 14.5 deg flank angle for external and internal threads are given in Table 8.

3.12.7 Tolerance on Circular Runout. When measurement is specified, the circular runout (full indicator movement) between the major cylinder and the pitch cylinder of the external thread or the minor cylinder and pitch cylinder of the internal thread shall not exceed the external thread pitch diameter allowance given in Table 9. See para. 2.12.7 for limitations.

3.12.8 Tolerance on Taper and Roundness. When measurement is specified, the tolerance on taper and roundness, respectively, shall not exceed one-half the pitch diameter tolerance.

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TABLE 14 TOLERANCES AND ALLOWANCES FOR MAJOR DIAMETER, CENTRALIZING SINGLE-START ACME SCREW THREADS

		Allowance From Basic Major and Minor Diameters, All Classes			Tolerance on Minor Diameter, All Internal Threads (Plus 0.05 P) [Note (3)]	Tolerance on Major Diameter: Plus on Internal Threads and Minus on External Threads				
			Internal Thread			Class 2C	Class 3C		Class 4C	
Nominal Sizes	Threads/in.	Minor Diameter, All External (Minus) [Note (1)]	Major Diameter (Plus $0.0010\sqrt{D}$) [Note (2)]	Minor Diameter (Plus 0.1 P) [Note (1)]		External and Internal Threads, $0.0035\sqrt{D}$	External Thread, $0.0015\sqrt{D}$	Internal Thread, $0.0035\sqrt{D}$	External Thread, $0.0010\sqrt{D}$	Internal Thread, $0.0020\sqrt{D}$
1/4	16	0.010	0.0005	0.0062	0.0050	0.0018	0.0008	0.0018	0.0005	0.0010
5/16	14	0.010	0.0006	0.0071	0.0050	0.0020	0.0008	0.0020	0.0006	0.0011
3/8	12	0.010	0.0006	0.0083	0.0050	0.0021	0.0009	0.0021	0.0006	0.0012
7/16	12	0.010	0.0007	0.0083	0.0050	0.0023	0.0010	0.0023	0.0007	0.0013
1/2	10	0.020	0.0007	0.0100	0.0050	0.0025	0.0011	0.0025	0.0007	0.0014
5/8	8	0.020	0.0008	0.0125	0.0062	0.0028	0.0012	0.0028	0.0008	0.0016
3/4	6	0.020	0.0009	0.0167	0.0083	0.0030	0.0013	0.0030	0.0009	0.0017
7/8	6	0.020	0.0009	0.0167	0.0083	0.0033	0.0014	0.0033	0.0009	0.0019
1	5	0.020	0.0010	0.0200	0.0100	0.0035	0.0015	0.0035	0.0010	0.0020
1 1/8	5	0.020	0.0011	0.0200	0.0100	0.0037	0.0016	0.0037	0.0011	0.0021
1 1/4	5	0.020	0.0011	0.0200	0.0100	0.0039	0.0017	0.0039	0.0011	0.0022
1 3/8	4	0.020	0.0012	0.0250	0.0125	0.0041	0.0018	0.0041	0.0012	0.0023
1 1/2	4	0.020	0.0012	0.0250	0.0125	0.0043	0.0018	0.0043	0.0012	0.0024
1 3/4	4	0.020	0.0013	0.0250	0.0125	0.0046	0.0020	0.0046	0.0013	0.0026
2	4	0.020	0.0014	0.0250	0.0125	0.0049	0.0021	0.0049	0.0014	0.0028
2 1/4	3	0.020	0.0015	0.0333	0.0167	0.0053	0.0023	0.0053	0.0015	0.0030
2 1/2	3	0.020	0.0016	0.0333	0.0167	0.0055	0.0024	0.0055	0.0016	0.0032
2 3/4	3	0.020	0.0017	0.0333	0.0167	0.0058	0.0025	0.0058	0.0017	0.0033
3	2	0.020	0.0017	0.0500	0.0250	0.0061	0.0026	0.0061	0.0017	0.0035
3 1/2	2	0.020	0.0019	0.0500	0.0250	0.0065	0.0028	0.0065	0.0019	0.0037
4	2	0.020	0.0020	0.0500	0.0250	0.0070	0.0030	0.0070	0.0020	0.0040
4 1/2	2	0.020	0.0021	0.0500	0.0250	0.0074	0.0032	0.0074	0.0021	0.0042
5	2	0.020	0.0022	0.0500	0.0250	0.0078	0.0034	0.0078	0.0022	0.0045

GENERAL NOTES:
(a) The maximum angular play of a centralizing internal thread, one diameter long, on its external thread for the maximum major diameter clearance is 1 deg or less.
(b) Tolerance on minor diameter of all external thread is 1.5 × pitch diameter tolerance.

NOTES:
(1) The minimum clearance at the minor diameter between the internal and external thread is the sum of the values in columns three and five.
(2) The minimum clearance at the major diameter between the internal and external thread is equal to column four.
(3) To avoid a complicated formula and still provide an adequate tolerance, the pitch factor is used as a base with the minimum tolerance value set at 0.005 in.

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TABLE 15 LIMITING DIMENSIONS AND TOLERANCES FOR CENTRALIZING SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C

	External							Internal						
	Major Diameter		Pitch Diameter			Minor Diameter		Minor Diameter		Pitch Diameter			Major Diameter	
Designation	Max.	Min.	Max.	Min.	Tolerance	Max.	Min.	Min.	Max.	Min.	Max.	Tolerance	Min.	Max.
0.5000-10.0 ACME-2C	0.5000	0.4975	0.4443	0.4306	0.0137	0.3800	0.3594	0.4100	0.4150	0.4500	0.4637	0.0137	0.5007	0.5032
0.5000-10.0 ACME-3C	0.5000	0.4989	0.4458	0.4394	0.0064	0.3800	0.3704	0.4100	0.4150	0.4500	0.4564	0.0064	0.5007	0.5032
0.5000-10.0 ACME-4C	0.5000	0.4993	0.4472	0.4426	0.0046	0.3800	0.3731	0.4100	0.4150	0.4500	0.4546	0.0046	0.5007	0.5021
0.6250-8.0 ACME-2C	0.6250	0.6222	0.5562	0.5408	0.0154	0.4800	0.4570	0.5125	0.5188	0.5625	0.5779	0.0154	0.6258	0.6286
0.6250-8.0 ACME-3C	0.6250	0.6238	0.5578	0.5506	0.0072	0.4800	0.4693	0.5125	0.5188	0.5625	0.5697	0.0072	0.6258	0.6286
0.6250-8.0 ACME-4C	0.6250	0.6242	0.5593	0.5542	0.0051	0.4800	0.4723	0.5125	0.5188	0.5625	0.5676	0.0051	0.6258	0.6274
0.7500-6.0 ACME-2C	0.7500	0.7470	0.6598	0.6424	0.0174	0.5633	0.5371	0.6000	0.6083	0.6667	0.6841	0.0174	0.7509	0.7539
0.7500-6.0 ACME-3C	0.7500	0.7487	0.6615	0.6534	0.0081	0.5633	0.5511	0.6000	0.6083	0.6667	0.6748	0.0081	0.7509	0.7539
0.7500-6.0 ACME-4C	0.7500	0.7491	0.6632	0.6574	0.0058	0.5633	0.5546	0.6000	0.6083	0.6667	0.6725	0.0058	0.7509	0.7526
0.8750-6.0 ACME-2C	0.8750	0.8717	0.7842	0.7663	0.0179	0.6883	0.6615	0.7250	0.7333	0.7917	0.8096	0.0179	0.8759	0.8792
0.8750-6.0 ACME-3C	0.8750	0.8736	0.7861	0.7778	0.0083	0.6883	0.6758	0.7250	0.7333	0.7917	0.8000	0.0083	0.8759	0.8792
0.8750-6.0 ACME-4C	0.8750	0.8741	0.7880	0.7820	0.0060	0.6883	0.6794	0.7250	0.7333	0.7917	0.7977	0.0060	0.8759	0.8778
1.0000-5.0 ACME-2C	1.0000	0.9965	0.8920	0.8726	0.0194	0.7800	0.7509	0.8200	0.8300	0.9000	0.9194	0.0194	1.0010	1.0045
1.0000-5.0 ACME-3C	1.0000	0.9985	0.8940	0.8849	0.0091	0.7800	0.7664	0.8200	0.8300	0.9000	0.9091	0.0091	1.0010	1.0045
1.0000-5.0 ACME-4C	1.0000	0.9990	0.8960	0.8895	0.0065	0.7800	0.7703	0.8200	0.8300	0.9000	0.9065	0.0065	1.0010	1.0030
1.1250-5.0 ACME-2C	1.1250	1.1213	1.0165	0.9967	0.0198	0.9050	0.8753	0.9450	0.9550	1.0250	1.0448	0.0198	1.1261	1.1298
1.1250-5.0 ACME-3C	1.1250	1.1234	1.0186	1.0094	0.0092	0.9050	0.8912	0.9450	0.9550	1.0250	1.0342	0.0092	1.1261	1.1298
1.1250-5.0 ACME-4C	1.1250	1.1239	1.0208	1.0142	0.0066	0.9050	0.8951	0.9450	0.9550	1.0250	1.0316	0.0066	1.1261	1.1282
1.2500-5.0 ACME-2C	1.2500	1.2461	1.1411	1.1210	0.0201	1.0300	0.9998	1.0700	1.0800	1.1500	1.1701	0.0201	1.2511	1.2550
1.2500-5.0 ACME-3C	1.2500	1.2483	1.1433	1.1339	0.0094	1.0300	1.0159	1.0700	1.0800	1.1500	1.1594	0.0094	1.2511	1.2550
1.2500-5.0 ACME-4C	1.2500	1.2489	1.1455	1.1388	0.0067	1.0300	1.0199	1.0700	1.0800	1.1500	1.1567	0.0067	1.2511	1.2533
1.3750-4.0 ACME-2C	1.3750	1.3709	1.2406	1.2186	0.0220	1.1050	1.0719	1.1500	1.1625	1.2500	1.2720	0.0220	1.3762	1.3803
1.3750-4.0 ACME-3C	1.3750	1.3732	1.2430	1.2327	0.0103	1.1050	1.0896	1.1500	1.1625	1.2500	1.2603	0.0103	1.3762	1.3803
1.3750-4.0 ACME-4C	1.3750	1.3738	1.2453	1.2380	0.0073	1.1050	1.0940	1.1500	1.1625	1.2500	1.2573	0.0073	1.3762	1.3785
1.5000-4.0 ACME-2C	1.5000	1.4957	1.3652	1.3429	0.0223	1.2300	1.1965	1.2750	1.2875	1.3750	1.3973	0.0223	1.5012	1.5055
1.5000-4.0 ACME-3C	1.5000	1.4982	1.3677	1.3573	0.0104	1.2300	1.2144	1.2750	1.2875	1.3750	1.3854	0.0104	1.5012	1.5055
1.5000-4.0 ACME-4C	1.5000	1.4988	1.3701	1.3627	0.0074	1.2300	1.2188	1.2750	1.2875	1.3750	1.3824	0.0074	1.5012	1.5036
1.7500-4.0 ACME-2C	1.7500	1.7454	1.6145	1.5916	0.0229	1.4800	1.4456	1.5250	1.5375	1.6250	1.6479	0.0229	1.7513	1.7559
1.7500-4.0 ACME-3C	1.7500	1.7480	1.6171	1.6064	0.0107	1.4800	1.4639	1.5250	1.5375	1.6250	1.6357	0.0107	1.7513	1.7559
1.7500-4.0 ACME-4C	1.7500	1.7487	1.6198	1.6122	0.0076	1.4800	1.4685	1.5250	1.5375	1.6250	1.6326	0.0076	1.7513	1.7539

(continued)

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TABLE 15 LIMITING DIMENSIONS AND TOLERANCES FOR CENTRALIZING SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C (CONT'D)

	External							Internal						
	Major Diameter		Pitch Diameter			Minor Diameter		Minor Diameter		Pitch Diameter			Major Diameter	
Designation	Max.	Min.	Max.	Min.	Tolerance	Max.	Min.	Min.	Max.	Min.	Max.	Tolerance	Min.	Max.
2.0000-4.0 ACME-2C	2.0000	1.9951	1.8637	1.8402	0.0235	1.7300	1.6948	1.7750	1.7875	1.8750	1.8985	0.0235	2.0014	2.0063
2.0000 4.0 ACME-3C	2.0000	1.9979	1.8665	1.8555	0.0110	1.7300	1.7136	1.7750	1.7875	1.8750	1.8860	0.0110	2.0014	2.0063
2.0000-4.0 ACME-4C	2.0000	1.9986	1.8693	1.8615	0.0078	1.7300	1.7183	1.7750	1.7875	1.8750	1.8828	0.0078	2.0014	2.0042
2.2500-3.0 ACME-2C	2.2500	2.2448	2.0713	2.0450	0.0263	1.8967	1.8572	1.9500	1.9667	2.0833	2.1096	0.0263	2.2515	2.2567
2.2500-3.0 ACME-3C	2.2500	2.2448	2.0743	2.0620	0.0123	1.8967	1.8783	1.9500	1.9667	2.0833	2.0956	0.0123	2.2515	2.2567
2.2500-3.0 ACME-4C	2.2500	2.2485	2.0773	2.0685	0.0088	1.8967	1.8835	1.9500	1.9667	2.0833	2.0921	0.0088	2.2515	2.2545
2.5000-3.0 ACME-2C	2.5000	2.4945	2.3207	2.2939	0.0268	2.1467	2.1065	2.2000	2.2167	2.3333	2.3601	0.0268	2.5016	2.5071
2.5000-3.0 ACME-3C	2.5000	2.4976	2.3238	2.3113	0.0125	2.1467	2.1279	2.2000	2.2167	2.3333	2.3458	0.0125	2.5016	2.5071
2.5000-3.0 ACME-4C	2.5000	2.4984	2.3270	2.3181	0.0089	2.1467	2.1333	2.2000	2.2167	2.3333	2.3422	0.0089	2.5016	2.5048
2.7500-3.0 ACME-2C	2.7500	2.7442	2.5700	2.5427	0.0273	2.3967	2.3558	2.4500	2.4667	2.5833	2.6106	0.0273	2.7517	2.7575
2.7500-3.0 ACME-3C	2.7500	2.7475	2.5734	2.5607	0.0127	2.3967	2.3776	2.4500	2.4667	2.5833	2.5960	0.0127	2.7517	2.7575
2.7500-3.0 ACME-4C	2.7500	2.7483	2.5767	2.5676	0.0091	2.3967	2.3831	2.4500	2.4667	2.5833	2.5924	0.0091	2.7517	2.7550
3.0000-2.0 ACME-2C	3.0000	2.9939	2.7360	2.7044	0.0316	2.4800	2.4326	2.5500	2.5750	2.7500	2.7816	0.0316	3.0017	3.0078
3.0000-2.0 ACME-3C	3.0000	2.9974	2.7395	2.7248	0.0147	2.4800	2.4579	2.5500	2.5750	2.7500	2.7647	0.0147	3.0017	3.0078
3.0000-2.0 ACME-4C	3.0000	2.9983	2.7430	2.7325	0.0105	2.4800	2.4642	2.5500	2.5750	2.7500	2.7605	0.0105	3.0017	3.0052
3.5000-2.0 ACME-2C	3.5000	3.4935	3.2350	3.2026	0.0324	2.9800	2.9313	3.0500	3.0750	3.2500	3.2824	0.0324	3.5019	3.5084
3.5000-2.0 ACME-3C	3.5000	3.4972	3.2388	3.2237	0.0151	2.9800	2.9573	3.0500	3.0750	3.2500	3.2651	0.0151	3.5019	3.5084
3.5000-2.0 ACME-4C	3.5000	3.4981	3.2425	3.2317	0.0108	2.9800	2.9638	3.0500	3.0750	3.2500	3.2608	0.0108	3.5019	3.5056
4.0000-2.0 ACME-2C	4.0000	3.9930	3.7340	3.7008	0.0332	3.4800	3.4302	3.5500	3.5750	3.7500	3.7832	0.0332	4.0020	4.0090
4.0000-2.0 ACME-3C	4.0000	3.9970	3.7380	3.7225	0.0155	3.4800	3.4568	3.5500	3.5750	3.7500	3.7655	0.0155	4.0020	4.0090
4.0000-2.0 ACME-4C	4.0000	3.9980	3.7420	3.7309	0.0111	3.4800	3.4634	3.5500	3.5750	3.7500	3.7611	0.0111	4.0020	4.0060
4.5000-2.0 ACME-2C	4.5000	4.4926	4.2330	4.1991	0.0339	3.9800	3.9291	4.0500	4.0750	4.2500	4.2839	0.0339	4.5021	4.5095
4.5000-2.0 ACME-3C	4.5000	4.4968	4.2373	4.2215	0.0158	3.9800	3.9562	4.0500	4.0750	4.2500	4.2658	0.0158	4.5021	4.5095
4.5000-2.0 ACME-4C	4.5000	4.4979	4.2415	4.2302	0.0113	3.9800	3.9630	4.0500	4.0750	4.2500	4.2613	0.0113	4.5021	4.5063
5.0000-2.0 ACME-2C	5.0000	4.9922	4.7319	4.6973	0.0346	4.4800	4.4281	4.5500	4.5750	4.7500	4.7846	0.0346	5.0022	5.0100
5.0000-2.0 ACME-3C	5.0000	4.9966	4.7364	4.7202	0.0162	4.4800	4.4558	4.5500	4.5750	4.7500	4.7662	0.0162	5.0022	5.0100
5.0000-2.0 ACME-4C	5.0000	4.9978	4.7409	4.7294	0.0115	4.4800	4.4627	4.5500	4.5750	4.7500	4.7615	0.0115	5.0022	5.0067

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3.13 Allowances (Minimum Clearance) (*es*)

Allowance applied to the pitch diameter of the external thread for Classes 2C, 3C, and 4C are based on the major diameter and are given in Table 9.

3.14 Limits of Size

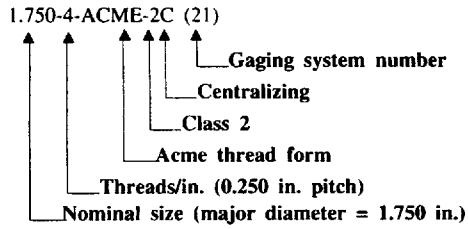
Limits of size for centralizing Acme threads of the standard series of diameters and pitches are given in Table 15. The application of these limits is illustrated in Fig. 5.

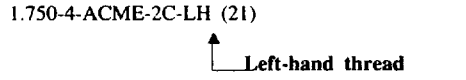
3.15 Thread Designations

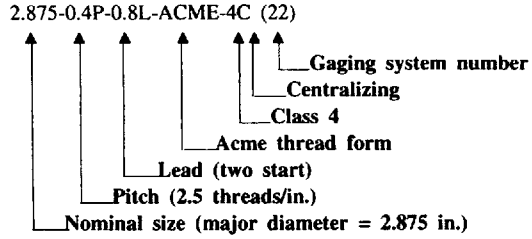
The following abbreviations are recommended for use on drawings, specifications, and on tools and gages:

ACME	Acme threads
C	centralizing
L	lead
P	pitch
LH	left hand
(2_)	gaging system 21, 22, or 23, as defined in ASME B1.3M

3.15.1 Examples of Designations (Single- and Multiple-Start Threads)







3.16 Formulas for Determining Diameters

Formulas follow for the basic, maximum, and minimum major, pitch, and minor diameters for external and internal threads of Classes 2C, 3C, and 4C with gage length not exceeding twice the basic major diameter.

3.16.1 Single-Start Threads

(a) External Threads

(1) Major diameter:

(Basic) maximum major diameter = nominal size or diameter D

$$d\ max. = d\ bsc = D\ bsc$$

Minimum major diameter = external maximum major diameter − Td (Table 14, column 7, 8, or 9)

$$d\ min. = d\ bsc - Td$$

(2) Pitch diameter:

Maximum pitch diameter = internal minimum pitch diameter − allowance (Table 9)

$$d_2\ max. = D_2\ min. - (es)$$

Minimum pitch diameter = external maximum pitch diameter − Td_2 (Table 5, 6, or 7)

$$d_2\ min. = d_2\ max. - Td_2$$

(3) Minor diameter:

Maximum minor diameter = external maximum major diameter − P − allowance (para. 3.5)

$$d_1\ max. = d\ max. - P - (es)$$

Minimum minor diameter = external maximum minor diameter − Td_1 (Table 13, column 4)

$$d_1\ min. = d_1\ max. - Td_1$$

(b) Internal Thread

(1) Major diameter:

Minimum major diameter = external maximum major diameter + allowance (Table 14, column 4)

$$D\ min. = d\ bsc + (EI)$$

Maximum major diameter = internal minimum major diameter + TD (Table 14, column 7, 9, or 11)

$$D\ max. = D\ min. + TD$$

(2) Pitch diameter:

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(Basic) minimum pitch diameter = external maximum major diameter – $P/2$

$$D_2\ min. = d\ bsc - P/2$$

Maximum pitch diameter = internal minimum pitch diameter + TD_2 (Table 5, 6, or 7)

$$D_2\ max. = D_2\ min. + TD_2$$

(3) Minor diameter:

(Basic) minimum minor diameter = external maximum major diameter – $P + 0.1P$

$$D_1\ min. = d\ max. - P + 0.1P$$

Maximum minor diameter = internal minimum minor diameter + TD_1 (Table 14, column 6)

$$D_1\ max. = D_1\ min. + TD_1$$

3.17 Maximum-Material Profile Option

In the case of manufacture by rolling, the external thread profile at the minor diameter may be modified in order to obtain a larger rounding on the root of the thread. The maximum minor diameter, $d_3\ max.$, of the external thread may in this case be reduced by $0.15P$.

If this profile modification is necessary, due to the particular method of manufacture, it must be agreed upon by the purchaser and the supplier.

4 GAGES FOR GENERAL PURPOSE ACME THREADS

The gaging system, described in ASME B1.3M for 60 deg threads, is applicable for 29 deg threads except for some gage requirements.

Acme screw thread product shall be gaged for acceptances as detailed below.

(a) System 21: Provides for interchangeable assembly with functional size control at the maximum-material limit within the length of the ASME B47.1 gage blanks, and also control of the characteristics identified as Not Go functional size.

Major diameter is inspected on the external thread and minor diameter on the internal thread.

Lead, flank angle, taper, roundness, and circular runout are not checked.

TABLE 16 ESTIMATED MEASUREMENT UNCERTAINTY VALUES FOR SCREW THREAD GAGE ELEMENTS

Nominal Thread Size	0.250 Through 1.500 in.		Above 1.500 Through 5.000 in.	
	External	Internal	External	Internal
Pitch Diameter, in.	0.0002	0.0004	0.00030	0.0006
Lead, in.	0.0001	0.0002	0.00015	0.0002
Half angle, min				
1–3 TPI	6	8	6	8
4–8 TPI	8	10	8	10
10–16 TPI	10	12	10	12

(b) System 22: Provides for interchangeable assembly with functional size control at maximum-material limit within the length of the ASME B47.1 gage blanks and also control of the minimum-material size limits over the length of the full thread. The cumulative form variations of the thread characteristics such as lead, flank angle, taper, and roundness is confined within the maximum- and minimum-material limits.

Major diameter is inspected on the external thread and minor diameter on the internal thread.

(c) System 23: Provides for interchangeable assembly with the functional size control at maximum-material limit within the length of the ASME B47.1 gage blanks and also control of the minimum-material size limits over the length of the full thread. The magnitude of the other thread characteristics such as lead, flank angle, taper, roundness, and runout are measured to be within the specified limits. Only thread characteristics in System 23 for which requirements or limitations are specified must be evaluated for System 23 compliance.

Major diameter and minor diameter are measured.

(d) Agreement between parties for modification of the gaging requirements shall be on procurement contract.

(e) When no length of engagement is specified on procurement contract, use gage blanks in accordance with ASME B47.1. The length should be 3 pitches for Go gage.

4.1 Measurement Uncertainty Estimates

Measurement uncertainty is inherent in all types of measurements. The measurement uncertainty values presented in Table 16 are the best estimated values currently available for the variation in the dimensions of gages when the gage characteristics are measured. These variations are inherent in the gage measuring

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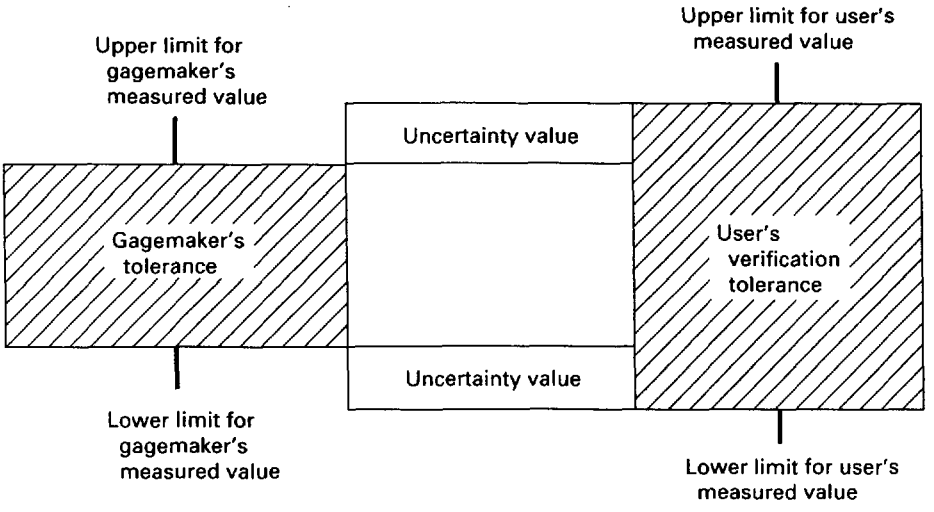


FIG. 6 GAGE ACCEPTANCE USING MEASUREMENT UNCERTAINTY

techniques and equipment. Measurement uncertainty values for lead and flank angle apply to measurements of variables gage segments or rolls as well as to fixed limit gages.

The measurement uncertainty values are based on the use of laboratory grade instruments, accepted measurement techniques, and a temperature span of 66°F to 70°F (18.9°C to 21.1°C). They do not increase gage tolerances. They recognize that tabulated tolerance limits are not absolute when size is in dispute.

4.2 Application

The application of measurement uncertainty is illustrated in Fig. 6. Measurement values are plus/minus.

The gage manufacturer shall make the gage within applicable tabulated gage (gagemaker's) tolerance. However, if the customer measures the gage outside of tolerance, but within the user's verification tolerance, the gage shall be acceptable. See Fig. 6. Parties shall not round measured values into tolerance zone if the next decimal place results in value outside these zones.

4.3 Gage Blanks

Use gage blanks in accordance with ASME B47.1 (see Table 18) unless otherwise specified in the procurement contract.

4.4 Gage Tolerances

Tolerances for the thread elements of Go and Not Go thread gages, working and setting, for general purpose Acme threads, are given in Table 17.

4.4.1 Tolerances on Pitch Diameter. The pitch diameter tolerances for gages for Classes 2G, 3G, and 4G, external and internal threads, are given in Table 17.

See Appendix E4 or F4 for the wire or ball measurement of pitch diameter on gages with large lead angles, approximately 5 deg and larger.

4.4.2 Tolerances on Major and Minor Diameters. The tolerances for the major diameter of thread plug and minor diameter of the thread ring gages for general purpose Acme threads are given in Table 17.

4.4.3 Tolerances on Lead. The variation in lead of Acme thread gages for Classes 3G and 4G product shall not exceed 0.0002 in. between any two threads not farther apart than 1 in. However, the variation in lead shall not exceed 0.0003 in. for gages and indicating gage contacts with a length over 1 in. through 3 in.; or 0.0004 in. for gages with a length over 3 in. through 5 in.; or 0.0006 in. for gages with a length over 5 in. For gages for Class 2G product, 0.0001 in. shall be added to the above values. See Appendix B for multiple-start threads.

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TABLE 17 TOLERANCES FOR GO AND NOT GO THREAD GAGES, WORKING AND SETTING, GENERAL PURPOSE SINGLE-START ACME SCREW THREADS (0.250 in. Through 5.000 in.)

Threads/in. [Note (1)]	Tolerance on Pitch Diameters [Note (2)]		All Sizes Tolerance on Thread Plug Major and Thread Ring Minor Diameters	Tolerance on Half-Angle of Thread ±	
	Class 2G	Classes 3G and 4G		deg	min
32	0.0006	0.0005	0.001	0	10
16	0.0006	0.0005	0.001	0	10
14	0.0006	0.0005	0.001	0	10
12	0.0006	0.0006	0.001	0	10
10	0.0007	0.0006	0.002	0	10
8	0.0008	0.0007	0.002	0	8
6	0.0009	0.0007	0.002	0	8
5	0.0010	0.0008	0.002	0	8
4	0.0011	0.0008	0.002	0	8
3	0.0013	0.0008	0.002	0	6
2½	0.0014	0.0009	0.002	0	6
2	0.0015	0.0010	0.002	0	6
1½	0.0018	0.0010	0.002	0	5
1⅓	0.0018	0.0010	0.002	0	5
1	0.0021	0.0010	0.002	0	5

GENERAL NOTE: Tolerances for plain gages are given in Table 23.

NOTES:

(1) Intermediate pitches take the tolerances of the next coarser pitch listed in the Table.

(2) These pitch diameter tolerances for thread gages are not cumulative; they do not include tolerances on lead and on half-angle.

4.4.4 Tolerances on Half Angle of Thread. The tolerances shall apply to both the half angle and the optical projected half angle of gage threads. They are specified in Table 17 for the various pitches. This insures that the bisector of the included angle will be perpendicular to the axis of the thread within proper limits. The local deviations from the true thread form caused by such irregularities as convex or concave sides of threads, or slight projections on the thread form, shall not exceed the tolerance permitted on angle of thread. The flank angle tolerances apply to the actual thread flank contact length between gages or between gage and product. When flank angles are measured by optical projection, see Appendix G2 for correction from normal to axial flank angle.

4.4.5 Functional Size. Functional diameter includes the effects of all variations in pitch diameter, thread form, profile, and length of engagement. Therefore for limit gaging the functional diameter size has the same limits as pitch diameter size. For a measured pitch diameter to be acceptable at the maximum-material size of external or internal thread, the thread form must be perfect.

4.4.6 End, Partial, or Entry Threads. The partial or incomplete entry/end threads of all general purpose Acme thread gages above 0.500 in. shall be removed by convolution to a full form. Multiple-start gages and gages for sizes 0.500 in. and smaller may be chamfered.

4.5 Gages for External Threads

Limits of size for Go and Not Go setting plug gages for external general purpose Acme thread gages are given in Tables 19 and 20, and for Go and Not Go working ring gages in Table 21.

4.5.1 Go Functional Thread Ring or Indicating Gage

(a) Major Diameter. The major diameter of the Go ring gage or indicating gage contacts shall clear the maximum major diameter of the external part by 0.010 in. minimum for new gages. For recalibration of used

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TABLE 18
ASME B47.1 GO GAGE BLANK LENGTHS

Nominal Size	Go Ring Gage Length	Go Plug Gage Length
0.2500-16	0.3437	0.5000
0.3125-14	0.3437	0.5000
0.3750-12	0.4375	0.7500
0.4375-12	0.4375	0.7500
0.5000-10	0.4375	0.7500
0.6250-8	0.7500	0.8750
0.7500-6	0.7500	0.8750
0.8750-6	0.9375	1.0000
1.0000-5	0.9375	1.0000
1.1250-5	0.9375	1.0000
1.2500-5	1.1250	1.2500
1.3750-4	1.1250	1.2500
1.5000-4	1.1250	1.2500
1.7500-4	1.2500	1.8750
2.0000-4	1.2500	1.8750
2.2500-3	1.3125	2.0000
2.5000-3	1.3125	2.0000
2.7500-3	1.3750	2.0000
3.0000-2	1.3750 [Note (1)]	2.0000
3.5000-2	1.4375 [Note (1)]	2.0000
4.0000-2	1.5000 [Note (1)]	2.1250
4.5000-2	1.5000 [Note (1)]	2.1250
5.0000-2	1.5000 [Note (1)]	2.1250

GENERAL NOTE:
Values are for reference only; see the latest revision of ASME B47.1.

NOTE:
(1) Gage blanks have less than 3 threads engagement.

gages, the ring should have sufficient clearance at the major diameter to clear the full form of the setting gage. The determination of this clearance is best facilitated by the use of a truncated setting plug rather than a full-form setting plug gage.

NOTE: Threads per inch finer than 16 may not be practical or possible to achieve 0.010 in. minimum clearance. The clearance in the ring at the major diameter is acceptable if the ring can be properly set on a truncated setting plug and the ring clears the full-form major diameter on the setting plug.

(b) Pitch Diameter. The Go thread ring gage size shall be set by its fit on the maximum-material limit thread Go setting plug gage (see Table 19). The indicating Go functional gage is also set to the Go setting plug gage.

(c) Minor Diameter. The minor diameter shall be the same as the maximum minor diameter of the external thread plus 0.005 in. for pitches finer than 10 threads/in. and plus 0.010 in. for 10 threads/in. and coarser. The tolerance shall be minus.

(d) Length. When no special length of engagement is specific on the procurement contract, use standard gaging blanks per ASME B47.1 (see Table 18). The length should approximate 3 pitches for single-start threads. See para. 4.7 for LE greater than ring gage length.

(e) Thread Form. The Go ring thread form is illustrated in Fig. 7, and the indicating gage contact thread form is shown in Fig. 8.

4.5.2 Maximum-Material Limit Thread Setting Plug for Go Thread Ring or Indicating Gages

(a) Major Diameter. The major diameter of the full-form portion of the thread setting plug gage shall be the same as the maximum major diameter of the external thread. The gage tolerance shall be plus. The major diameter of the truncated section shall be smaller than the maximum major diameter of the external thread by an amount equal to $P/6$. The gage tolerance shall be minus.

(b) Pitch Diameter. The pitch diameter of the thread setting plug shall be the same as the maximum pitch diameter of the external thread. The gage tolerance shall be minus. It is recommended that indicating gages be set from Class 3G/3C/4G/4C Go set plug gages, adjusting for measured pitch diameter.

(c) Minor Diameter. The minor diameter shall be cleared below the minimum minor diameter of the Go thread ring gage, thread snap, or indicating gage.

(d) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18).

(e) Thread Form. Thread form for the Go full form and the truncated form is shown in Fig. 9.

4.5.3 Not Go Thread Ring

(a) Major Diameter. The major diameter of the Not Go ring gage or indicating gage contacts shall clear the maximum major diameter of the external part by 0.010 in. minimum for new gages. For recalibration of used gages, the ring should have sufficient clearance at the major diameter to clear the full form of the setting gage. The determination of this clearance is best facilitated by the use of a truncated setting plug rather than a full-form setting plug gage.

NOTE: Threads/in. finer than 16 may not be practical or possible to achieve 0.010 in. minimum clearance. The clearance in the ring at the major diameter is acceptable if the ring can be properly set on a truncated setting plug and the ring clears the full-form major diameter on the setting plug.

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TABLE 19 GO SETTING PLUG GAGES FOR WORKING ADJUSTABLE RING GAGES AND INDICATING GAGES FOR EXTERNAL THREAD AND GO WORKING PLUG GAGES FOR INTERNAL THREAD, GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G

	Go External Setting Plug							Go Internal Working Plug				
	Major Diameter											
	Full Form		Truncated		Pitch Diameter		Minor Diameter, Clear	Minor Diameter, Min.	Pitch Diameter		Major Diameter	
Designation	Max.	Min.	Max.	Min.	Max.	Min.	Reference	Reference	Min.	Max.	Min.	Max.
0.2500-16.0 ACME-2G	0.2510	0.2500	0.2396	0.2386	0.2148	0.2142	0.1775	0.1775	0.2188	0.2194	0.2550	0.2560
0.2500-16.0 ACME-3G	0.2510	0.2500	0.2396	0.2386	0.2158	0.2153	0.1775	0.1775	0.2188	0.2193	0.2550	0.2560
0.2500-16.0 ACME-4G	0.2510	0.2500	0.2396	0.2386	0.2168	0.2163	0.1775	0.1775	0.2188	0.2193	0.2550	0.2560
0.3125-14.0 ACME-2G	0.3135	0.3125	0.3006	0.2996	0.2728	0.2722	0.2311	0.2311	0.2768	0.2774	0.3175	0.3185
0.3125-14.0 ACME-3G	0.3135	0.3125	0.3006	0.2996	0.2738	0.2733	0.2311	0.2311	0.2768	0.2773	0.3175	0.3185
0.3125-14.0 ACME-4G	0.3135	0.3125	0.3006	0.2996	0.2748	0.2743	0.2311	0.2311	0.2768	0.2773	0.3175	0.3185
0.3750-12.0 ACME-2G	0.3760	0.3750	0.3611	0.3601	0.3284	0.3278	0.2817	0.2817	0.3333	0.3339	0.3800	0.3810
0.3750-12.0 ACME-3G	0.3760	0.3750	0.3611	0.3601	0.3296	0.3290	0.2817	0.2817	0.3333	0.3339	0.3800	0.3810
0.3750-12.0 ACME-4G	0.3760	0.3750	0.3611	0.3601	0.3309	0.3303	0.2817	0.2817	0.3333	0.3339	0.3800	0.3810
0.4375-12.0 ACME-2G	0.4385	0.4375	0.4236	0.4226	0.3909	0.3903	0.3442	0.3442	0.3958	0.3964	0.4425	0.4435
0.4375-12.0 ACME-3G	0.4385	0.4375	0.4236	0.4226	0.3921	0.3915	0.3442	0.3442	0.3958	0.3964	0.4425	0.4435
0.4375-12.0 ACME-4G	0.4385	0.4375	0.4236	0.4226	0.3934	0.3928	0.3442	0.3442	0.3958	0.3964	0.4425	0.4435
0.5000-10.0 ACME-2G	0.5020	0.5000	0.4833	0.4813	0.4443	0.4436	0.3800	0.3900	0.4500	0.4507	0.5100	0.5120
0.5000-10.0 ACME-3G	0.5020	0.5000	0.4833	0.4813	0.4458	0.4452	0.3800	0.3900	0.4500	0.4506	0.5100	0.5120
0.5000-10.0 ACME-4G	0.5020	0.5000	0.4833	0.4813	0.4472	0.4466	0.3800	0.3900	0.4500	0.4506	0.5100	0.5120
0.6250-8.0 ACME-2G	0.6270	0.6250	0.6042	0.6022	0.5562	0.5554	0.4800	0.4900	0.5625	0.5633	0.6350	0.6370
0.6250-8.0 ACME-3G	0.6270	0.6250	0.6042	0.6022	0.5578	0.5571	0.4800	0.4900	0.5625	0.5632	0.6350	0.6370
0.6250-8.0 ACME-4G	0.6270	0.6250	0.6042	0.6022	0.5593	0.5586	0.4800	0.4900	0.5625	0.5632	0.6350	0.6370
0.7500-6.0 ACME-2G	0.7520	0.7500	0.7222	0.7202	0.6598	0.6589	0.5633	0.5733	0.6667	0.6676	0.7600	0.7620
0.7500-6.0 ACME-3G	0.7520	0.7500	0.7222	0.7202	0.6615	0.6608	0.5633	0.5733	0.6667	0.6674	0.7600	0.7620
0.7500-6.0 ACME-4G	0.7520	0.7500	0.7222	0.7202	0.6632	0.6625	0.5633	0.5733	0.6667	0.6674	0.7600	0.7620
0.8750-6.0 ACME-2G	0.8770	0.8750	0.8472	0.8452	0.7842	0.7833	0.6883	0.6983	0.7917	0.7926	0.8850	0.8870
0.8750-6.0 ACME-3G	0.8770	0.8750	0.8472	0.8452	0.7861	0.7854	0.6883	0.6983	0.7917	0.7924	0.8850	0.8870
0.8750-6.0 ACME-4G	0.8770	0.8750	0.8472	0.8452	0.7880	0.7873	0.6883	0.6983	0.7917	0.7924	0.8850	0.8870

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TABLE 19 GO SETTING PLUG GAGES FOR WORKING ADJUSTABLE RING GAGES AND INDICATING GAGES FOR EXTERNAL THREAD AND GO WORKING PLUG GAGES FOR INTERNAL THREAD, GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G (CONT'D)

	Go External Setting Plug							Go Internal Working Plug				
	Major Diameter											
	Full Form		Truncated		Pitch Diameter		Minor Diameter, Clear	Minor Diameter, Min.	Pitch Diameter		Major Diameter	
Designation	Max.	Min.	Max.	Min.	Max.	Min.	Reference	Reference	Min.	Max.	Min.	Max.
1.0000-5.0 ACME-2G	1.0020	1.0000	0.9667	0.9647	0.8920	0.8910	0.7800	0.7900	0.9000	0.9010	1.0100	1.0120
1.0000-5.0 ACME-3G	1.0020	1.0000	0.9667	0.9647	0.8940	0.8932	0.7800	0.7900	0.9000	0.9008	1.0100	1.0120
1.0000-5.0 ACME-4G	1.0020	1.0000	0.9667	0.9647	0.8960	0.8952	0.7800	0.7900	0.9000	0.9008	1.0100	1.0120
1.1250-5.0 ACME-2G	1.1270	1.1250	1.0917	1.0897	1.0165	1.0155	0.9050	0.9150	1.0250	1.0260	1.1350	1.1370
1.1250-5.0 ACME-3G	1.1270	1.1250	1.0917	1.0897	1.0186	1.0178	0.9050	0.9150	1.0250	1.0258	1.1350	1.1370
1.1250-5.0 ACME-4G	1.1270	1.1250	1.0917	1.0897	1.0208	1.0200	0.9050	0.9150	1.0250	1.0258	1.1350	1.1370
1.2500-5.0 ACME-2G	1.2520	1.2500	1.2167	1.2147	1.1411	1.1401	1.0300	1.0400	1.1500	1.1510	1.2600	1.2620
1.2500-5.0 ACME-3G	1.2520	1.2500	1.2167	1.2147	1.1433	1.1425	1.0300	1.0400	1.1500	1.1508	1.2600	1.2620
1.2500-5.0 ACME-4G	1.2520	1.2500	1.2167	1.2147	1.1455	1.1447	1.0300	1.0400	1.1500	1.1508	1.2600	1.2620
1.3750-4.0 ACME-2G	1.3770	1.3750	1.3333	1.3313	1.2406	1.2395	1.1050	1.1150	1.2500	1.2511	1.3850	1.3870
1.3750-4.0 ACME-3G	1.3770	1.3750	1.3333	1.3313	1.2430	1.2422	1.1050	1.1150	1.2500	1.2508	1.3850	1.3870
1.3750-4.0 ACME-4G	1.3770	1.3750	1.3333	1.3313	1.2453	1.2445	1.1050	1.1150	1.2500	1.2508	1.3850	1.3870
1.5000-4.0 ACME-2G	1.5020	1.5000	1.4583	1.4563	1.3652	1.3641	1.2300	1.2400	1.3750	1.3761	1.5100	1.5120
1.5000-4.0 ACME-3G	1.5020	1.5000	1.4583	1.4563	1.3677	1.3669	1.2300	1.2400	1.3750	1.3758	1.5100	1.5120
1.5000-4.0 ACME-4G	1.5020	1.5000	1.4583	1.4563	1.3701	1.3693	1.2300	1.2400	1.3750	1.3758	1.5100	1.5120
1.7500-4.0 ACME-2G	1.7520	1.7500	1.7083	1.7063	1.6145	1.6134	1.4800	1.4900	1.6250	1.6261	1.7600	1.7620
1.7500-4.0 ACME-3G	1.7520	1.7500	1.7083	1.7063	1.6171	1.6163	1.4800	1.4900	1.6250	1.6258	1.7600	1.7620
1.7500-4.0 ACME-4G	1.7520	1.7500	1.7083	1.7063	1.6198	1.6190	1.4800	1.4900	1.6250	1.6258	1.7600	1.7620
2.0000-4.0 ACME-2G	2.0020	2.0000	1.9583	1.9563	1.8637	1.8626	1.7300	1.7400	1.8750	1.8761	2.0100	2.0120
2.0000-4.0 ACME-3G	2.0020	2.0000	1.9583	1.9563	1.8665	1.8657	1.7300	1.7400	1.8750	1.8758	2.0100	2.0120
2.0000-4.0 ACME-4G	2.0020	2.0000	1.9583	1.9563	1.8693	1.8685	1.7300	1.7400	1.8750	1.8758	2.0100	2.0120
2.2500-3.0 ACME-2G	2.2520	2.2500	2.1944	2.1924	2.0713	2.0700	1.8967	1.9067	2.0833	2.0846	2.2600	2.2620
2.2500-3.0 ACME-3G	2.2520	2.2500	2.1944	2.1924	2.0743	2.0735	1.8967	1.9067	2.0833	2.0841	2.2600	2.2620
2.2500-3.0 ACME-4G	2.2520	2.2500	2.1944	2.1924	2.0773	2.0765	1.8967	1.9067	2.0833	2.0841	2.2600	2.2620

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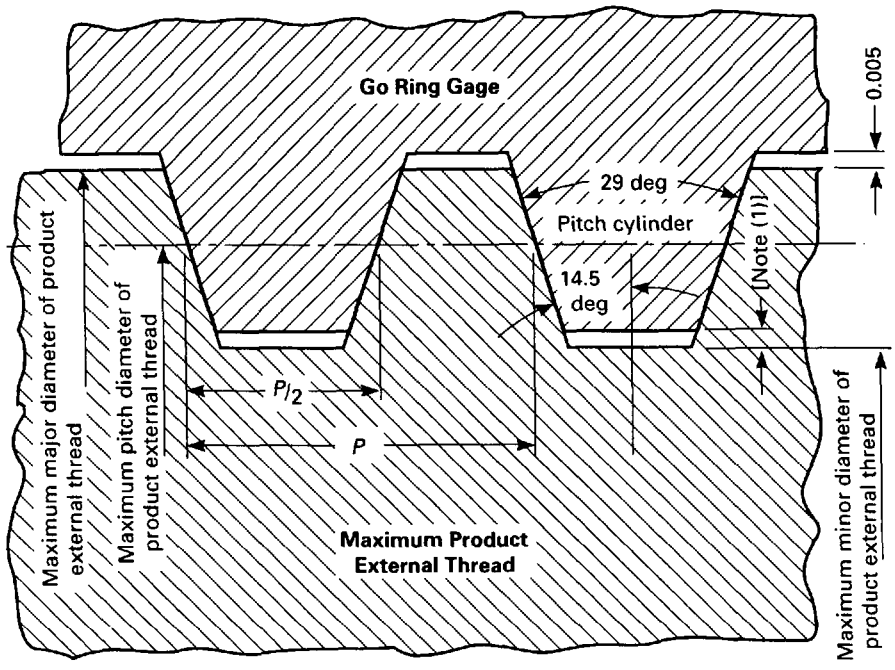
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TABLE 19 GO SETTING PLUG GAGES FOR WORKING ADJUSTABLE RING GAGES AND INDICATING GAGES FOR EXTERNAL THREAD AND GO WORKING PLUG GAGES FOR INTERNAL THREAD, GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G (CONT'D)

	Go External Setting Plug							Go Internal Working Plug				
	Major Diameter											
	Full Form		Truncated		Pitch Diameter		Minor Diameter, Clear	Minor Diameter, Min.	Pitch Diameter		Major Diameter	
Designation	Max.	Min.	Max.	Min.	Max.	Min.	Reference	Reference	Min.	Max.	Min.	Max.
2.5000-3.0 ACME-2G	2.5020	2.5000	2.4444	2.4424	2.3207	2.3194	2.1467	2.1567	2.3333	2.3346	2.5100	2.5120
2.5000-3.0 ACME-3G	2.5020	2.5000	2.4444	2.4424	2.3238	2.3230	2.1467	2.1567	2.3333	2.3341	2.5100	2.5120
2.5000-3.0 ACME-4G	2.5020	2.5000	2.4444	2.4424	2.3270	2.3262	2.1467	2.1567	2.3333	2.3341	2.5100	2.5120
2.7500-3.0 ACME-2G	2.7520	2.7500	2.6944	2.6924	2.5700	2.5687	2.3967	2.4067	2.5833	2.5846	2.7600	2.7620
2.7500-3.0 ACME-3G	2.7520	2.7500	2.6944	2.6924	2.5734	2.5726	2.3967	2.4067	2.5833	2.5841	2.7600	2.7620
2.7500-3.0 ACME-4G	2.7520	2.7500	2.6944	2.6924	2.5767	2.5759	2.3967	2.4067	2.5833	2.5841	2.7600	2.7620
3.0000-2.0 ACME-2G	3.0020	3.0000	2.9167	2.9147	2.7360	2.7345	2.4800	2.4900	2.7500	2.7515	3.0100	3.0120
3.0000-2.0 ACME-3G	3.0020	3.0000	2.9167	2.9147	2.7395	2.7385	2.4800	2.4900	2.7500	2.7510	3.0100	3.0120
3.0000-2.0 ACME-4G	3.0020	3.0000	2.9167	2.9147	2.7430	2.7420	2.4800	2.4900	2.7500	2.7510	3.0100	3.0120
3.5000-2.0 ACME-2G	3.5020	3.5000	3.4167	3.4147	3.2350	3.2335	2.9800	2.9900	3.2500	3.2515	3.5100	3.5120
3.5000-2.0 ACME-3G	3.5020	3.5000	3.4167	3.4147	3.2388	3.2378	2.9800	2.9900	3.2500	3.2510	3.5100	3.5120
3.5000-2.0 ACME-4G	3.5020	3.5000	3.4167	3.4147	3.2425	3.2415	2.9800	2.9900	3.2500	3.2510	3.5100	3.5120
4.0000-2.0 ACME-2G	4.0020	4.0000	3.9167	3.9147	3.7340	3.7325	3.4800	3.4900	3.7500	3.7515	4.0100	4.0120
4.0000-2.0 ACME-3G	4.0020	4.0000	3.9167	3.9147	3.7380	3.7370	3.4800	3.4900	3.7500	3.7510	4.0100	4.0120
4.0000-2.0 ACME-4G	4.0020	4.0000	3.9167	3.9147	3.7420	3.7410	3.4800	3.4900	3.7500	3.7510	4.0100	4.0120
4.5000-2.0 ACME-2G	4.5020	4.5000	4.4167	4.4147	4.2330	4.2315	3.9800	3.9900	4.2500	4.2515	4.5100	4.5120
4.5000-2.0 ACME-3G	4.5020	4.5000	4.4167	4.4147	4.2373	4.2363	3.9800	3.9900	4.2500	4.2510	4.5100	4.5120
4.5000-2.0 ACME-4G	4.5020	4.5000	4.4167	4.4147	4.2415	4.2405	3.9800	3.9900	4.2500	4.2510	4.5100	4.5120
5.0000-2.0 ACME-2G	5.0020	5.0000	4.9167	4.9147	4.7319	4.7304	4.4800	4.4900	4.7500	4.7515	5.0100	5.0120
5.0000-2.0 ACME-3G	5.0020	5.0000	4.9167	4.9147	4.7364	4.7354	4.4800	4.4900	4.7500	4.7510	5.0100	5.0120
5.0000-2.0 ACME-4G	5.0020	5.0000	4.9167	4.9147	4.7409	4.7399	4.4800	4.4900	4.7500	4.7510	5.0100	5.0120

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NOTE:
(1) For greater than 10 threads/in., 0.0025 in.; for 10 threads/in. and less, 0.0050 in.

FIG. 7 MAXIMUM-MATERIAL GO FUNCTIONAL LIMIT FOR EXTERNAL THREAD

The major diameter of the full-form portion of the thread setting plug gage shall be the same as the maximum major diameter of the external thread. The gage tolerance shall be plus. The major diameter of the truncated section shall be smaller than the maximum major diameter of the external thread by an amount equal to $P/6$. The gage tolerance shall be minus. Clearance cut is optional, unless specified in the procurement contract.

(b) Pitch Diameter. The size of a Not Go ring gage is determined by its fit on the minimum-material limit thread setting plug gage.

(c) Minor Diameter. The minor diameter shall be the basic minor diameter of the internal thread plus $P/4$ with the tolerance taken plus. If this results in a minor diameter larger than the gage pitch diameter size, the gage pitch diameter size shall be used for the minor diameter size with the gage tolerance taken minus.

(d) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18).

(e) Thread Form. Thread form is shown in Fig. 10.

4.5.4 Minimum-Material Pitch Diameter Indicating Thread Gage

(a) Purpose and Use. The indicating gage with cone and vee segments, zero lead rolls, and the thread groove diameter type with balls inspects the minimum-material size of the product thread. The three-segment and three-roll gage can check roundness of pitch cylinder for 120 deg lobing and taper of pitch cylinder. The two-segment, two-roll, or two-ball gage checks even lobing roundness and taper. The indicating gage is set to the Go thread setting plug gage. Readings indicate the position of the product external thread pitch diameter.

(b) Design. The cone and vee indicating thread gage has rolls or segments that contact over the pitch cylinder. The thread groove type indicating thread gage has "best size" radius rolls or balls that contact close to the pitch cylinder.

(c) Thread Form. The specifications on form of cone and vee segments, cone and vee rolls, and thread groove diameter balls are shown in Figs. 11 and 12.

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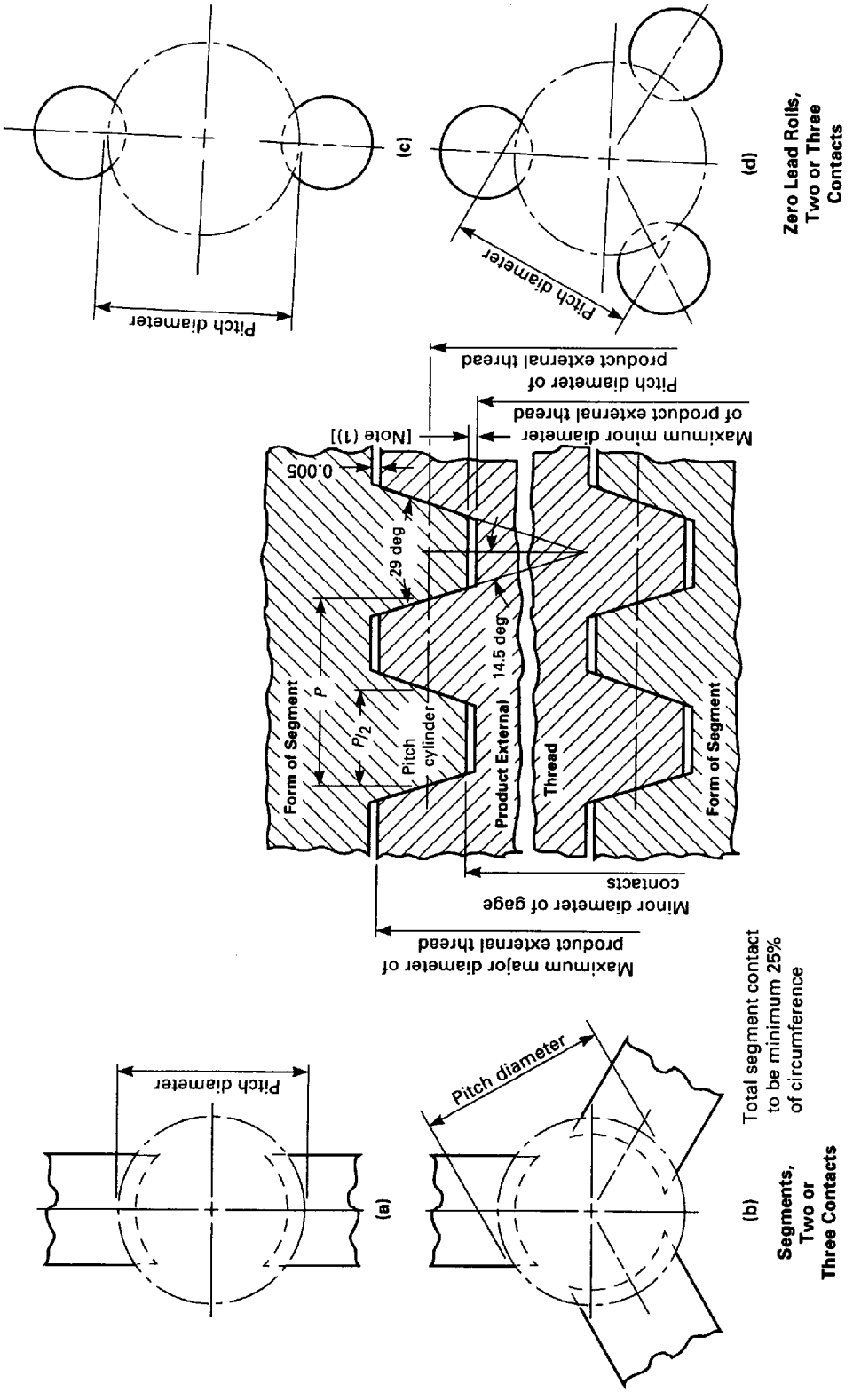


FIG. 8 INDICATING THREAD GAGES — MAXIMUM-MATERIAL GO FUNCTIONAL DIAMETER LIMIT AND SIZE FOR EXTERNAL THREAD

NOTE:
(1) For greater than 10 threads/in., 0.0025 in.; for 10 threads/in. and less, 0.0050 in.

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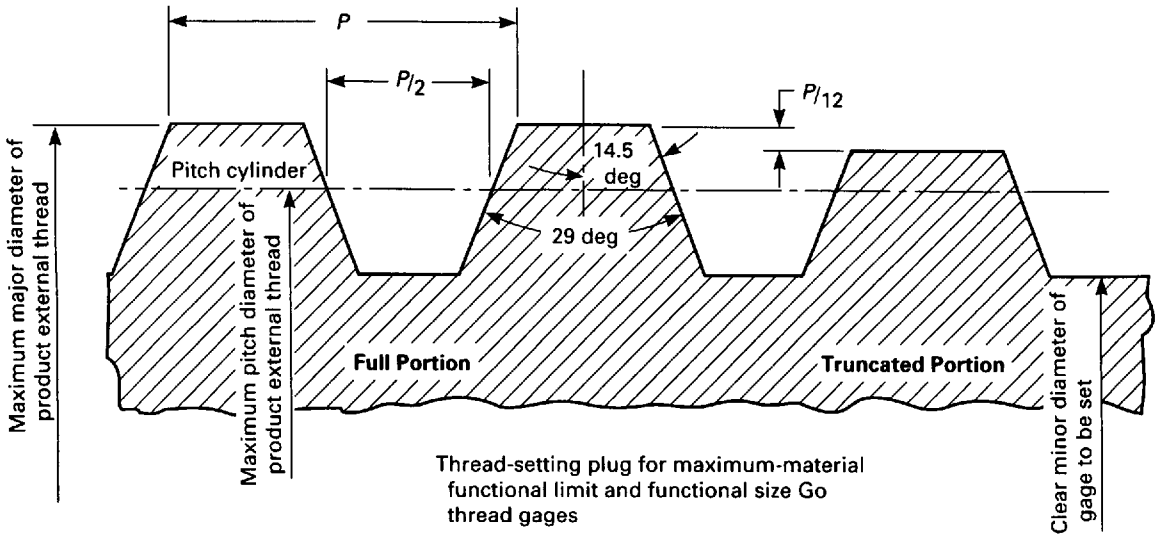


FIG. 9 GO THREAD FORM — FULL-FORM AND TRUNCATED SETTING PLUG GAGE FOR EXTERNAL THREAD

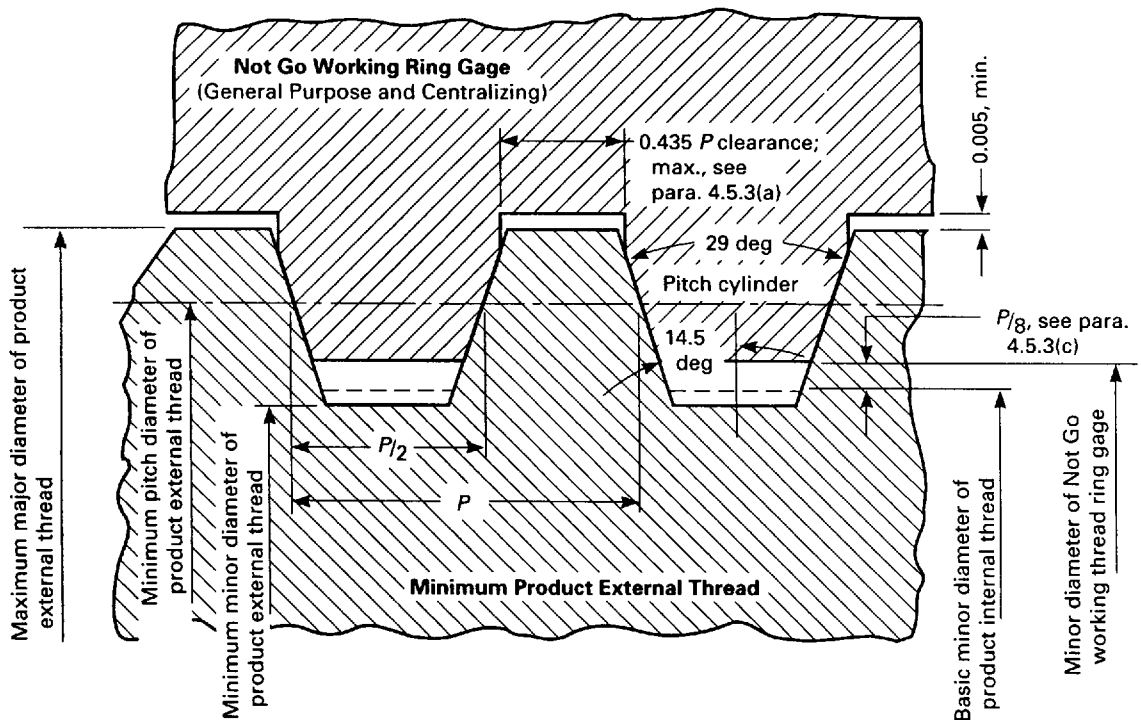


FIG. 10 NOT GO FUNCTIONAL DIAMETER LIMIT FOR EXTERNAL THREAD

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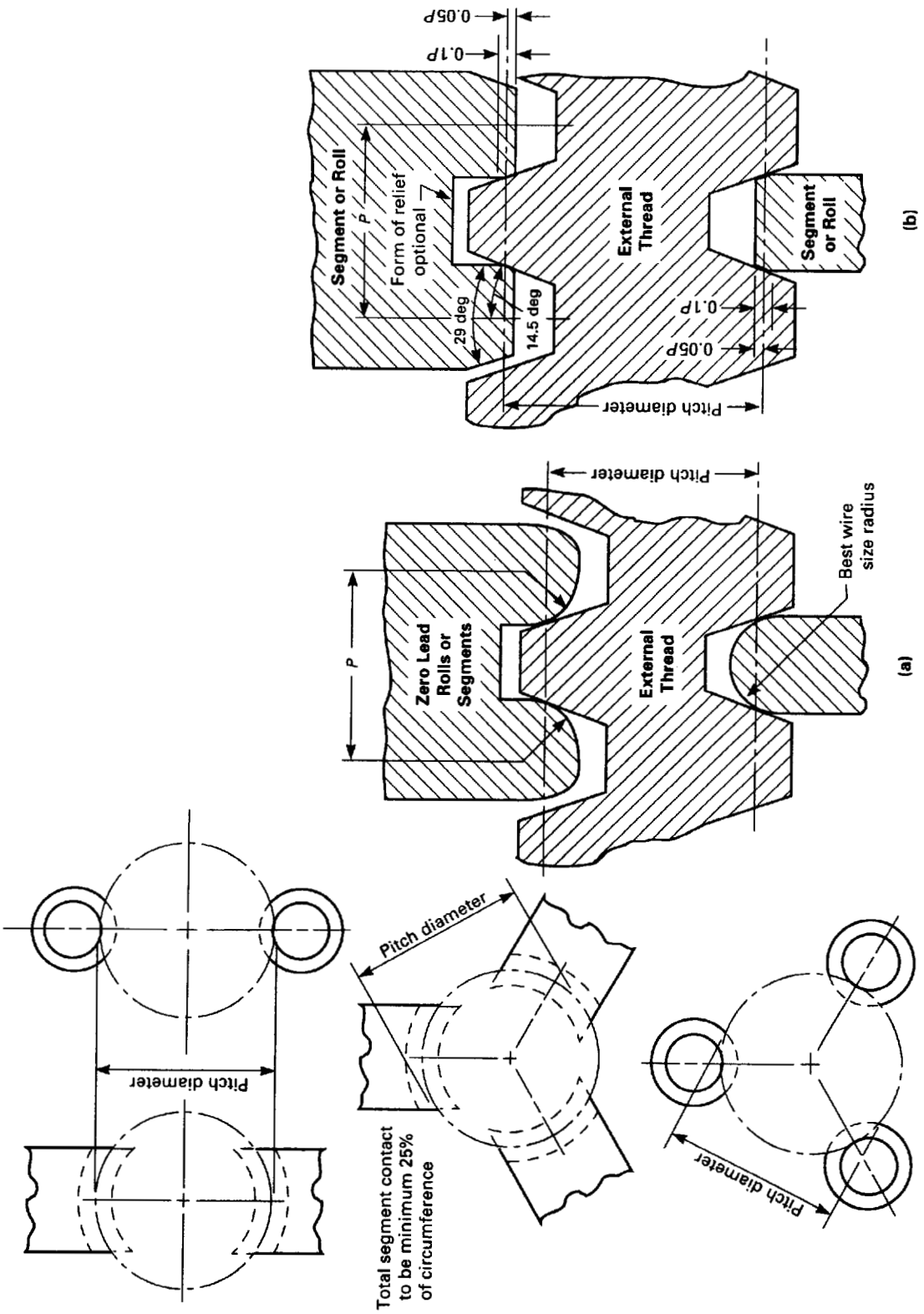


FIG. 11 INDICATING THREAD GAGES — MINIMUM-MATERIAL PITCH DIAMETER LIMIT AND SIZE, CONE AND VEE, FOR EXTERNAL THREAD

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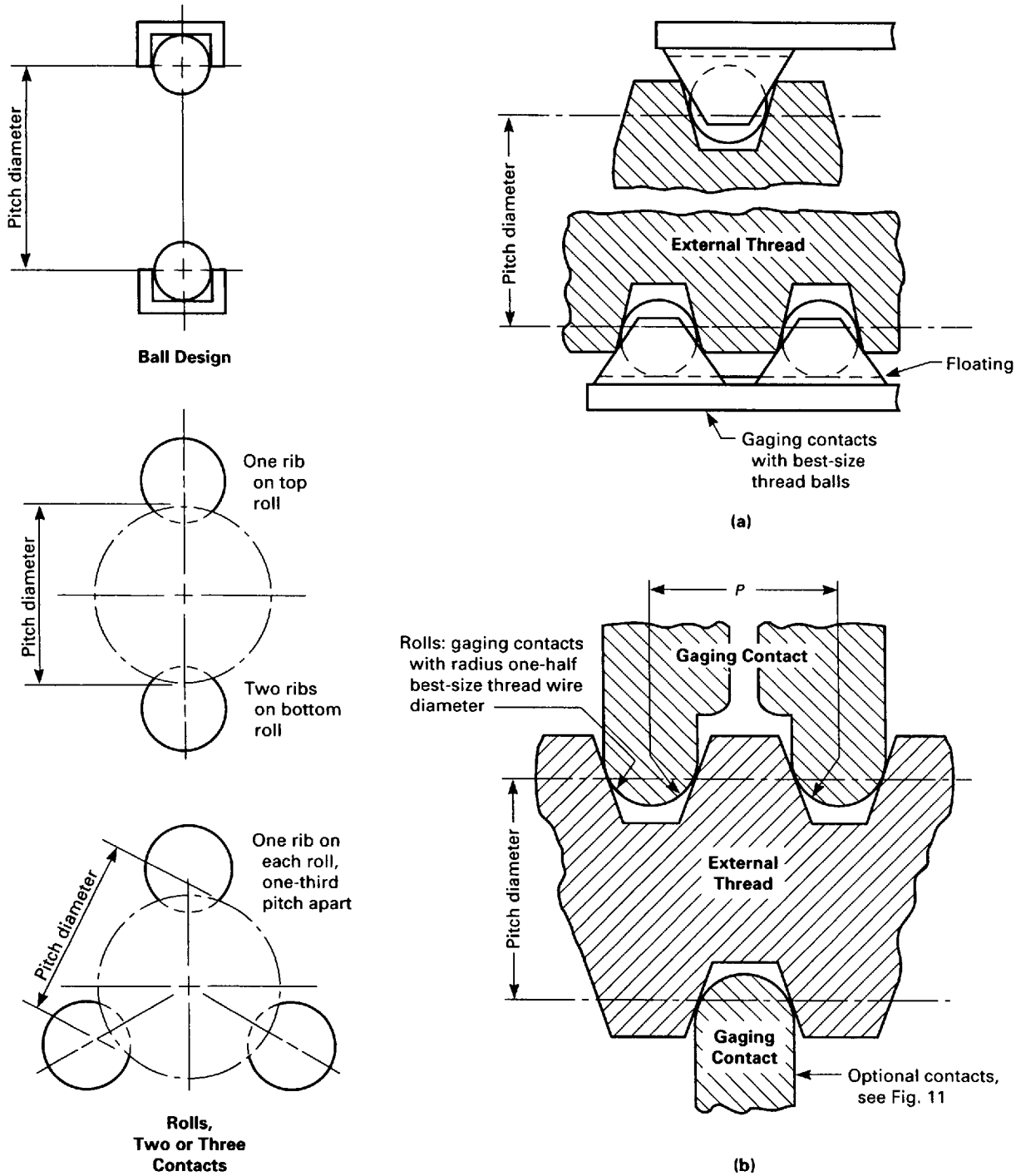


FIG. 12 INDICATING THREAD GAGES — MINIMUM-MATERIAL THREAD GROOVE DIAMETER LIMIT AND SIZE FOR EXTERNAL THREAD

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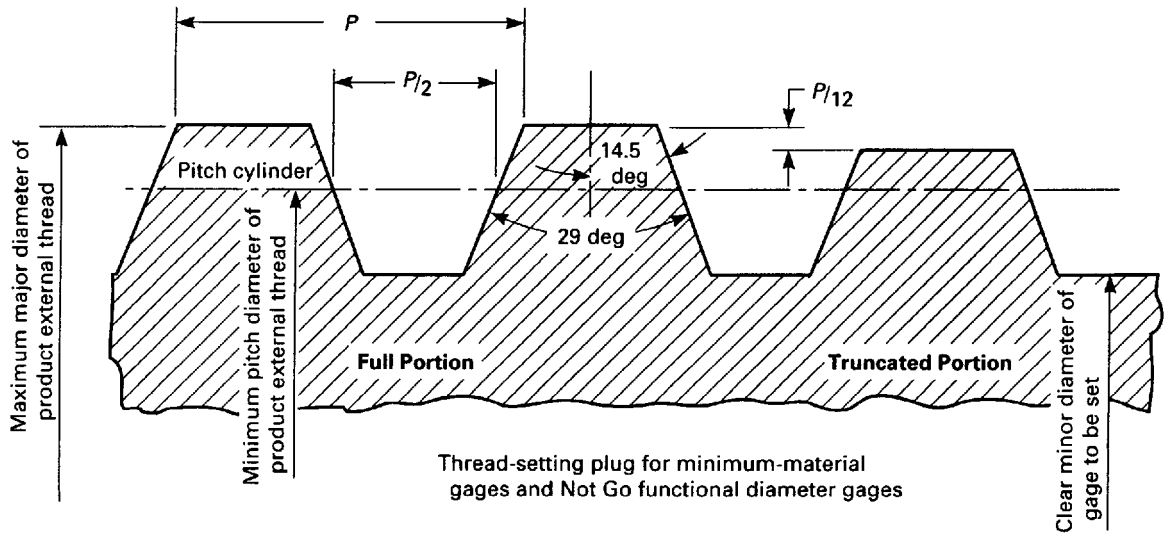


FIG. 13 THREAD FORM OF FULL-FORM AND TRUNCATED THREAD SETTING PLUG GAGE FOR EXTERNAL THREAD NOT GO THREAD GAGE

4.5.5 Minimum-Material Limit Thread Setting Plug for Not Go Thread Ring Gage

(a) Major Diameter for Full-Form Gage. The major diameter of the full-form portion of the thread setting plug shall be the same as the maximum major diameter of the external thread. The gage tolerance shall be plus.

(b) Major Diameter for Truncated Gage. The major diameter of the truncated portion of the minimum-material limit thread setting plug gage shall be one-third the basic thread depth ($P/6$) smaller than the maximum major diameter of the external thread. The gage tolerance shall be minus.

(c) Pitch Diameter. The pitch diameter shall be the same as the minimum pitch diameter of the external thread, with the tolerance taken plus.

(d) Minor Diameter. The minor diameter shall be cleared below the minimum minor diameter of the Not Go thread ring gage.

(e) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18).

(f) Thread Form. Thread form for full-form and truncated Not Go thread setting plug gage is shown in Fig. 13.

4.5.6 Go Plain Ring, Snap, or Indicating Gage for Major Diameter. The diameter of the Go plain ring gage, or gaging dimensions of the Go plain snap gage shall be the same as the maximum major diameter of the external product thread. Tolerances are shown in Table 23 and shall be minus. Fig. 14 shows the major diameter indicating gage.

4.5.7 Not Go Plain Ring or Snap Gage for Major Diameter. The diameter of the Not Go plain ring gage or the gaging dimensions of the Not Go plain snap gage shall be the same as the minimum major diameter of the external product thread. Tolerances are shown in Table 23 and shall be plus.

4.5.8 Indicating Gage for Minor Diameter. The designs for the minor diameter indicating gage are shown in Fig. 15 where the root width must be less than the thread root width to clear. The gage is set to the maximum minor diameter of the external product thread.

4.5.9 Indicating Gage for Circular Runout

(a) Purpose and Use. This indicating gage inspects the circular runout of the major diameter to the pitch diameter of the product external thread. Readings indicate the position of product major diameter to the pitch diameter within the specified tolerance.

(b) Design. Indicating gages have three contacts, one plain and two threaded at 120 deg, or two contacts, one plain and one threaded, at 180 deg, as shown in Fig. 16. The threaded segments or roll contacts are minimum-material pitch diameter type shown in Fig. 11. The ball type is shown in Fig. 16, sketch (b). The length of the plain contact is designed equal to the

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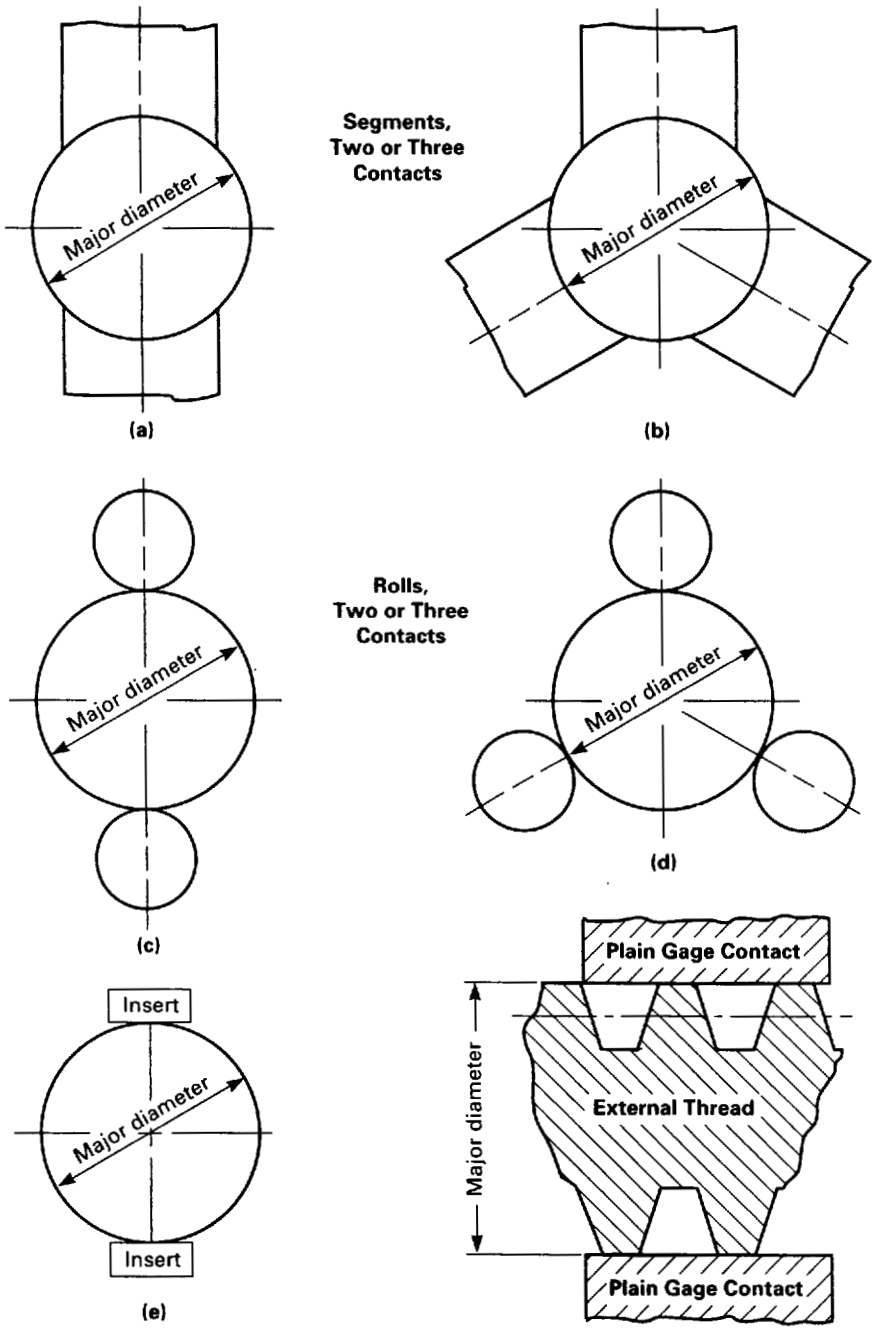


FIG. 14 INDICATING PLAIN DIAMETER GAGES — MAXIMUM/MINIMUM MAJOR DIAMETER LIMIT AND SIZE FOR EXTERNAL THREAD

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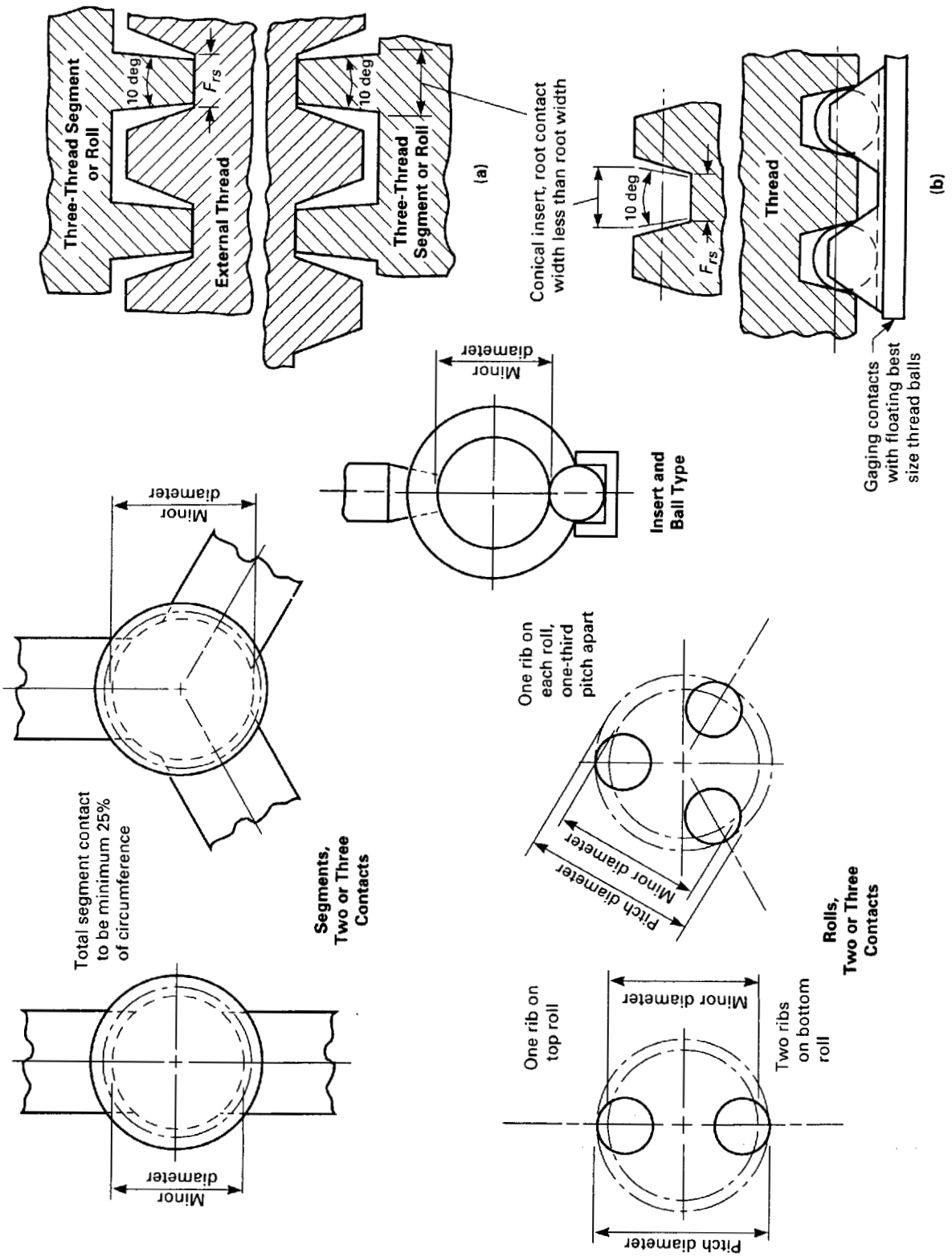


FIG. 15 INDICATING DIAMETER GAGES — MAXIMUM/MINIMUM MINOR DIAMETER LIMIT AND SIZE FOR EXTERNAL THREAD

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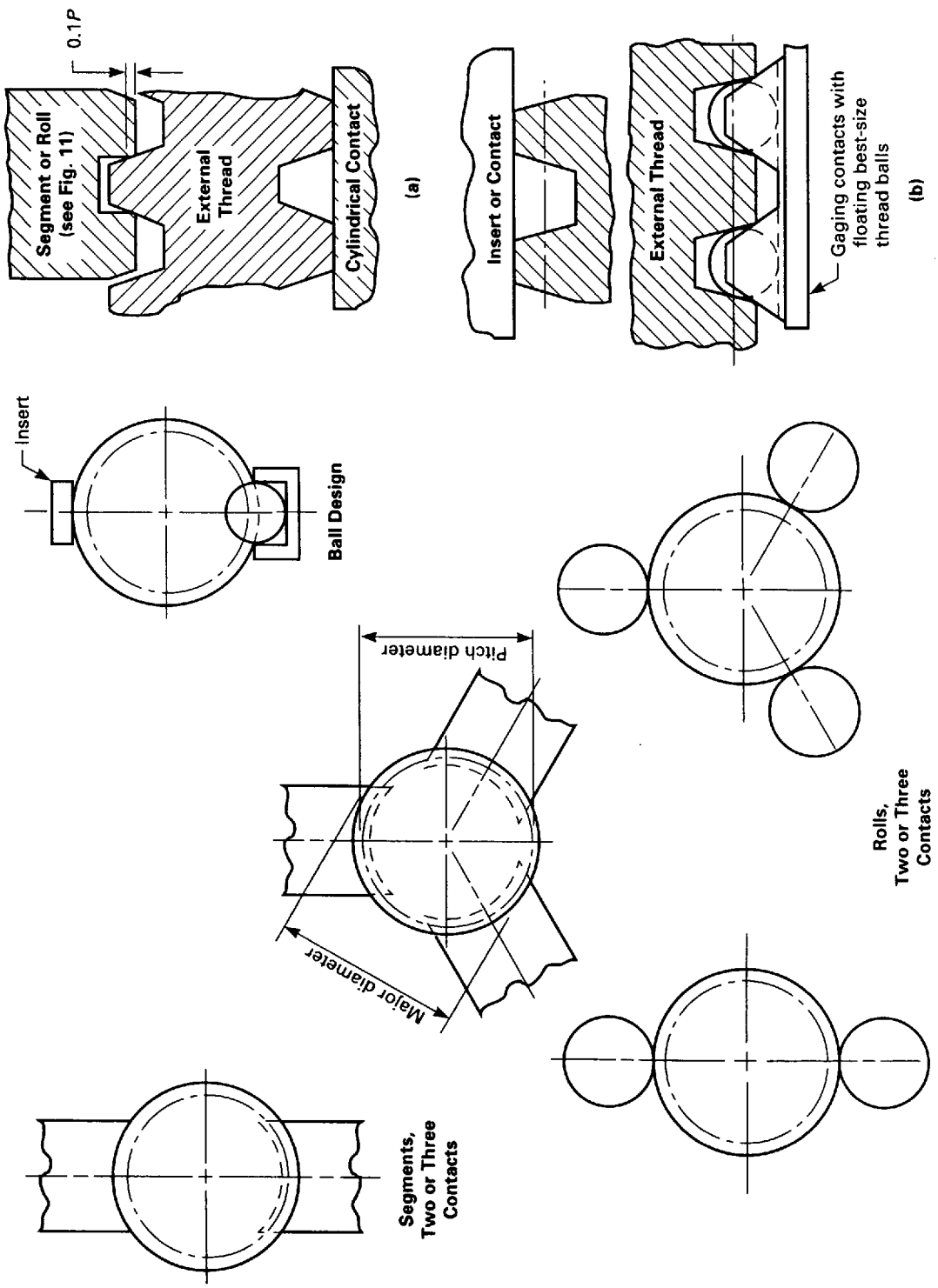


FIG. 16 INDICATING THREAD GAGES — DIAMETER RUNOUT, MAJOR TO PITCH DIAMETER, FOR EXTERNAL THREAD

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length of the standard Go ring gage. The indicating gage is set to the Go full-form thread setting plug gage.

(c) Thread Form. See (b) above.

4.5.10 Differential Gaging on External Thread. Every thread has two gaged sizes: functional diameter and pitch diameter. The pitch diameter is the gaged size with the least thread element variation. The functional diameter is the gaged size that includes all thread element variations. Only when a thread is perfect, i.e., there are no variations in lead (including helical path), flank angles, taper, straightness, and roundness, are these gaged sizes equal. A variation of a single-thread element on an external thread increases the functional size in relation to the pitch diameter. Cumulative thread element differential gaging measures the sum of all single element variations resulting in the functional size. Single-thread element differential gaging measures each portion of the total pitch diameter change generated by lead and flank angle variations from a perfect thread.

(a) Single-Element Lead Variation Differential Gaging. The lead variation differential is the difference in indicator readings (Z-Y) illustrated in Fig. 17. The two readings are taken without rotating the external product thread. The (Z) reading is made with the maximum-material Go functional indicating gages illustrated in Fig. 8 and the (Y) reading is made with the full-form single cone and vee indicating gage illustrated in Fig. 18. The lead differential shall not exceed the specified percentage of pitch diameter tolerance.

(b) Single-Element Angle Variation Differential Gaging. The angle variation differential is the difference in indicator readings (Y-X) illustrated in Fig. 17. The two readings are taken in the same thread without rotating the external threaded product. The (Y) reading is made with the full-form single cone and vee indicating gage illustrated in Fig. 18 and the (X) reading is made with the minimum-material pitch diameter indicating gages illustrated in Fig. 11. The angle differential shall not exceed the specified percentage of pitch diameter tolerance. This type of gaging does not check whether the bisector of the flank angles is perpendicular to the thread axis.

(c) Cumulative Form Differential Gaging. The cumulative form differential is the difference in indicator readings (Z-X) illustrated in Fig. 17. The (Z) reading is the maximum reading taken around and along the external thread. The (X) reading is the minimum reading taken around and along the external thread. (Z) reading is taken with functional gage (see Fig. 8) and the (X) reading is taken with the pitch diameter gage (see Fig. 11). The cumulative differential shall not exceed the pitch diameter tolerance.

4.5.11 Identification. The gages should be marked by nominal size, threads/in., ACME, Class, Acme type G, GO or NOT GO, and pitch diameter.

EXAMPLE: 1/4-16 ACME-2G GO PD 0.2148.

4.6 Gages for Internal Threads

Limits of size are given in Table 19 for Go and in Table 20 for Not Go working plug gages for internal general purpose Acme threads, and indicating solid-setting ring gage values are given in Table 22.

4.6.1 Go Functional Working Thread Plug or Indicating Gage With Segments or Zero Lead Full-Form Rolls

(a) Major Diameter. The major diameter of the Go thread plug gage shall be equal to the minimum major diameter of the internal product thread minus 0.005 in. for pitches finer than 10 threads/in., and minus 0.010 in. for 10 threads/in. and coarser. The tolerance shall be plus.

(b) Pitch Diameter. The pitch diameter shall be equal to the minimum (basic) pitch diameter of the internal thread, with the tolerance plus.

(c) Minor Diameter. The minor diameter shall clear a diameter smaller by 0.010 in., minimum, than minimum minor diameter of the internal thread.

NOTE: The minor diameter of the working plug gage is a clearance only. A minimum of 0.010 in. is suggested. More clearance is acceptable, but note that on threads finer than 16 TPI, even a 0.010 in. clearance may not be possible. In such cases, the gage manufacturer will have to determine an amount to clear the minimum minor diameter of the internal thread.

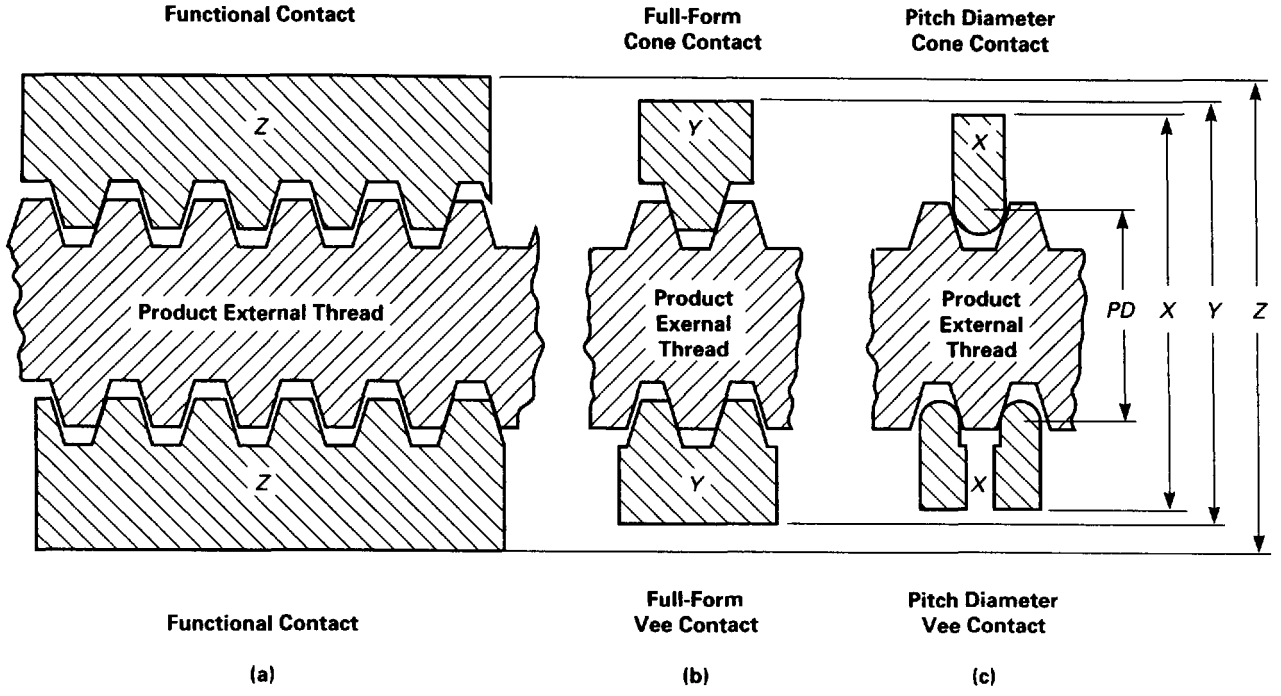
(d) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18), unless otherwise specified in the procurement contract. See para. 4.7 for LE greater than plug gage length.

(e) Thread Form. The Go plug thread form is shown in Fig. 19. The thread form on indicating gage contacts is shown in Fig. 20.

4.6.2 Not Go Working Thread Plug Gage

(a) Major Diameter. The major diameter of the Not Go thread plug gage shall be equal to the maximum (basic) major diameter of the external thread minus $P/4$, with the tolerance minus. If this results in a major diameter smaller than the gage pitch diameter size, the gage pitch diameter shall be used for the major diameter, with the gage tolerance plus.

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X = indicator reading for (minimum-material) pitch diameter and used for taper, straightness, and roundness measurements
Y = indicator reading used for lead differential analysis
Z = indicator reading for (maximum-material) functional size and used for lead differential analysis
$Z-X$ = cumulative form differential analysis $\Delta d_2 c$
$Z-Y$ = individual element analysis for lead differential $\Delta d_2 \lambda$
$Y-X$ = individual analysis for angle differential $\Delta d_2 \alpha$

FIG. 17 DIFFERENTIAL GAGING FOR EXTERNAL THREAD

(b) Pitch Diameter. The pitch diameter shall be the same as the maximum pitch diameter of the internal thread, with a minus tolerance.

(c) Minor Diameter. The minor diameter shall clear a diameter smaller by 0.010 in., minimum, than minimum minor diameter of the internal thread.

NOTE: The minor diameter of the working plug gage is a clearance only. A minimum of 0.010 in. is suggested. More clearance is acceptable, but note that on threads finer than 16 TPI, even a 0.010 in. clearance may not be possible. In such cases, the gage manufacturer will have to determine an amount to clear the minimum minor diameter of the internal thread.

Clearance cut is optional, unless specified in the procurement contract. Clearance cut may have $0.435P$ maximum width between intersections with the flanks of the thread.

(d) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18), unless otherwise specified in the procurement contract.

(e) Thread Form. The Not Go thread form is shown in Fig. 21.

4.6.3 Minimum-Material Pitch Diameter Indicating Thread Gage

(a) Purpose and Use. The indicating gage measures the minimum-material size of product internal thread. The gage is also used to check taper and roundness. The gage is set with a Go solid thread setting ring (see para. 4.6.4).

(b) Design. Indicating gages have three contacts positioned at 120 deg or two contacts positioned at 180 deg. Gages are made with segments or rolls with cone and vee design or balls.

(c) Thread Form. The specifications for cone and vee segments with flat or best size radiused contacts are shown in Fig. 22 and for best size balls or radiused zero lead rolls in Fig. 23.

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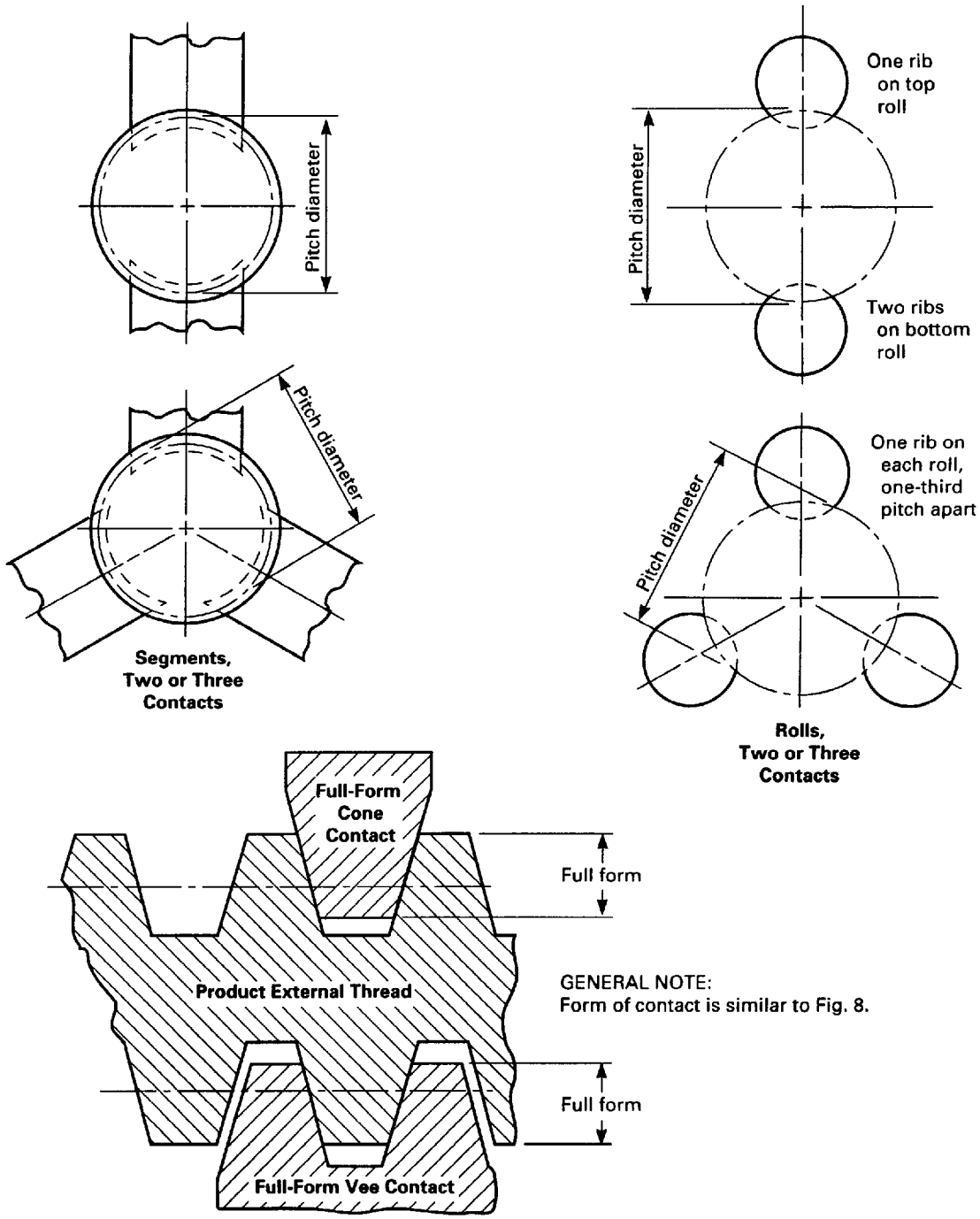


FIG. 18 SINGLE-THREAD, FULL-FORM INDICATING GAGES — CONE AND VEE HELICAL SEGMENTS AND ZERO LEAD ROLLS FOR EXTERNAL THREAD

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TABLE 20 NOT GO SETTING PLUG GAGES FOR WORKING ADJUSTABLE RING GAGES FOR EXTERNAL THREADS AND NOT GO WORKING PLUG GAGES FOR INTERNAL THREADS, GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G

	Not Go External Setting Plug							Not Go Internal Working Plug				
	Major Diameter											
	Full Form		Truncated		Pitch Diameter		Minor Diameter, Clear	Minor Diameter, Clear	Pitch Diameter		Major Diameter	
Designation	Max.	Min.	Max.	Min.	Max.	Min.	(Reference)	(Reference)	Min.	Max.	Min.	Max.
0.2500-16.0 ACME-2G	0.2510	0.2500	0.2396	0.2386	0.2049	0.2043	0.2031	0.1775	0.2289	0.2293	0.2334	0.2344
0.2500-16.0 ACME-3G	0.2510	0.2500	0.2396	0.2386	0.2114	0.2109	0.2031	0.1775	0.2232	0.2237	0.2334	0.2344
0.2500-16.0 ACME-4G	0.2510	0.2500	0.2396	0.2386	0.2138	0.2133	0.2031	0.1775	0.2218	0.2223	0.2334	0.2344
0.3125-14.0 ACME-2G	0.3135	0.3125	0.3006	0.2996	0.2620	0.2614	0.2590	0.2311	0.2876	0.2882	0.2935	0.2945
0.3125-14.0 ACME-3G	0.3135	0.3125	0.3006	0.2996	0.2690	0.2685	0.2590	0.2311	0.2816	0.2821	0.2935	0.2945
0.3125-14.0 ACME-4G	0.3135	0.3125	0.3006	0.2996	0.2715	0.2710	0.2590	0.2311	0.2801	0.2806	0.2935	0.2945
0.3750-12.0 ACME-2G	0.3760	0.3750	0.3611	0.3601	0.3167	0.3161	0.3125	0.2817	0.3450	0.3456	0.3532	0.3542
0.3750-12.0 ACME-3G	0.3760	0.3750	0.3611	0.3601	0.3244	0.3238	0.3125	0.2817	0.3385	0.3391	0.3532	0.3542
0.3750-12.0 ACME-4G	0.3760	0.3750	0.3611	0.3601	0.3274	0.3268	0.3125	0.2817	0.3368	0.3374	0.3532	0.3542
0.4375-12.0 ACME-2G	0.4385	0.4375	0.4236	0.4226	0.3789	0.3783	0.3750	0.3442	0.4078	0.4084	0.4157	0.4167
0.4375-12.0 ACME-3G	0.4385	0.4375	0.4236	0.4226	0.3867	0.3861	0.3750	0.3442	0.4011	0.4018	0.4157	0.4167
0.4375-12.0 ACME-4G	0.4385	0.4375	0.4236	0.4226	0.3898	0.3892	0.3750	0.3442	0.3994	0.4000	0.4157	0.4167
0.5000-10.0 ACME-2G	0.5020	0.5000	0.4833	0.4813	0.4313	0.4306	0.4250	0.3900	0.4630	0.4637	0.4730	0.4750
0.5000-10.0 ACME-3G	0.5020	0.5000	0.4833	0.4813	0.4400	0.4394	0.4250	0.3900	0.4548	0.4654	0.4730	0.4750
0.5000-10.0 ACME-4G	0.5020	0.5000	0.4833	0.4813	0.4432	0.4426	0.4250	0.3900	0.4540	0.4546	0.4730	0.4750
0.6250-8.0 ACME-2G	0.6270	0.6250	0.6042	0.6022	0.5416	0.5408	0.5312	0.4900	0.5771	0.5779	0.5918	0.5938
0.6250-8.0 ACME-3G	0.6270	0.6250	0.6042	0.6022	0.5513	0.5506	0.5312	0.4900	0.5690	0.5697	0.5918	0.5938
0.6250-8.0 ACME-4G	0.6270	0.6250	0.6042	0.6022	0.5549	0.5542	0.5312	0.4900	0.5669	0.5676	0.5918	0.5938
0.7500-6.0 ACME-2G	0.7520	0.7500	0.7222	0.7202	0.6433	0.6424	0.6250	0.5733	0.6832	0.6841	0.7063	0.7083
0.7500-6.0 ACME-3G	0.7520	0.7500	0.7222	0.7202	0.6541	0.6534	0.6250	0.5733	0.6741	0.6748	0.7063	0.7083
0.7500-6.0 ACME-4G	0.7520	0.7500	0.7222	0.7202	0.6581	0.6574	0.6250	0.5733	0.6718	0.6725	0.7063	0.7083
0.8750-6.0 ACME-2G	0.8770	0.8750	0.8472	0.8452	0.7672	0.7663	0.7500	0.6983	0.8087	0.8096	0.8313	0.8333
0.8750-6.0 ACME-3G	0.8770	0.8750	0.8472	0.8452	0.7785	0.7778	0.7500	0.6983	0.7993	0.8000	0.8313	0.8333
0.8750-6.0 ACME-4G	0.8770	0.8750	0.8472	0.8452	0.7827	0.7820	0.7500	0.6983	0.7970	0.7977	0.8313	0.8333

(continued)

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TABLE 20 NOT GO SETTING PLUG GAGES FOR WORKING ADJUSTABLE RING GAGES FOR EXTERNAL THREADS AND NOT GO WORKING PLUG GAGES FOR INTERNAL THREADS, GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G (CONT'D)

	Not Go External Setting Plug							Not Go Internal Working Plug				
	Major Diameter											
	Full Form		Truncated		Pitch Diameter		Minor Diameter, Clear (Reference)	Minor Diameter, Clear (Reference)	Pitch Diameter		Major Diameter	
Designation	Max.	Min.	Max.	Min.	Max.	Min.			Min.	Max.	Min.	Max.
1.0000-5.0 ACME-2G	1.0020	1.0000	0.9667	0.9647	0.8736	0.8726	0.8500	0.7900	0.9184	0.9194	0.9480	0.9500
1.0000-5.0 ACME-3G	1.0020	1.0000	0.9667	0.9647	0.8857	0.8849	0.8500	0.7900	0.9083	0.9091	0.9480	0.9500
1.0000-5.0 ACME-4G	1.0020	1.0000	0.9667	0.9647	0.8903	0.8895	0.8500	0.7900	0.9057	0.9065	0.9480	0.9500
1.1250-5.0 ACME-2G	1.1270	1.1250	1.0917	1.0897	0.9977	0.9967	0.9750	0.9150	1.0438	1.0448	1.0730	1.0750
1.1250-5.0 ACME-3G	1.1270	1.1250	1.0917	1.0897	1.0102	1.0094	0.9750	0.9150	1.0334	1.0342	1.0730	1.0750
1.1250-5.0 ACME-4G	1.1270	1.1250	1.0917	1.0897	1.0150	1.0142	0.9750	0.9150	1.0308	1.0316	1.0730	1.0750
1.2500-5.0 ACME-2G	1.2520	1.2500	1.2167	1.2147	1.1220	1.1210	1.1000	1.0400	1.1691	1.1701	1.1980	1.2000
1.2500-5.0 ACME-3G	1.2520	1.2500	1.2167	1.2147	1.1347	1.1339	1.1000	1.0400	1.1586	1.1594	1.1980	1.2000
1.2500-5.0 ACME-4G	1.2520	1.2500	1.2167	1.2147	1.1396	1.1388	1.1000	1.0400	1.1559	1.1567	1.1980	1.2000
1.3750-4.0 ACME-2G	1.3770	1.3750	1.3333	1.3313	1.2197	1.2186	1.1875	1.1150	1.2709	1.2720	1.3105	1.3125
1.3750-4.0 ACME-3G	1.3770	1.3750	1.3333	1.3313	1.2335	1.2327	1.1875	1.1150	1.2595	1.2603	1.3105	1.3125
1.3750-4.0 ACME-4G	1.3770	1.3750	1.3333	1.3313	1.2388	1.2380	1.1875	1.1150	1.2565	1.2573	1.3105	1.3125
1.5000-4.0 ACME-2G	1.5020	1.5000	1.4583	1.4563	1.3440	1.3429	1.3125	1.2400	1.3962	1.3973	1.4355	1.4375
1.5000-4.0 ACME-3G	1.5020	1.5000	1.4583	1.4563	1.3581	1.3573	1.3125	1.2400	1.3846	1.3854	1.4355	1.4375
1.5000-4.0 ACME-4G	1.5020	1.5000	1.4583	1.4563	1.3635	1.3627	1.3125	1.2400	1.3816	1.3824	1.4355	1.4375
1.7500-4.0 ACME-2G	1.7520	1.7500	1.7083	1.7063	1.5927	1.5916	1.5625	1.4900	1.6468	1.6479	1.6855	1.6875
1.7500-4.0 ACME-3G	1.7520	1.7500	1.7083	1.7063	1.6072	1.6064	1.5625	1.4900	1.6349	1.6357	1.6855	1.6875
1.7500-4.0 ACME-4G	1.7520	1.7500	1.7083	1.7063	1.6130	1.6122	1.5625	1.4900	1.6318	1.6326	1.6855	1.6875
2.0000-4.0 ACME-2G	2.0020	2.0000	1.9583	1.9563	1.8413	1.8402	1.8125	1.7400	1.8974	1.8985	1.9355	1.9375
2.0000-4.0 ACME-3G	2.0020	2.0000	1.9583	1.9563	1.8563	1.8555	1.8125	1.7400	1.8852	1.8860	1.9355	1.9375
2.0000-4.0 ACME-4G	2.0020	2.0000	1.9583	1.9563	1.8623	1.8615	1.8125	1.7400	1.8820	1.8828	1.9355	1.9375
2.2500-3.0 ACME-2G	2.2520	2.2500	2.1944	2.1924	2.0463	2.0450	1.9792	1.9067	2.1083	2.1096	2.1647	2.1667
2.2500-3.0 ACME-3G	2.2520	2.2500	2.1944	2.1924	2.0628	2.0620	1.9792	1.9067	2.0948	2.0956	2.1647	2.1667
2.2500-3.0 ACME-4G	2.2520	2.2500	2.1944	2.1924	2.0693	2.0685	1.9792	1.9067	2.0913	2.0921	2.1647	2.1667

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TABLE 20 NOT GO SETTING PLUG GAGES FOR WORKING ADJUSTABLE RING GAGES FOR EXTERNAL THREADS AND NOT GO WORKING PLUG GAGES FOR INTERNAL THREADS, GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G (CONT'D)

	Not Go External Setting Plug							Not Go Internal Working Plug				
	Major Diameter				Pitch Diameter		Minor Diameter, Clear	Minor Diameter, Clear	Pitch Diameter		Major Diameter	
	Full Form		Truncated									
Designation	Max.	Min.	Max.	Min.	Max.	Min.	(Reference)	(Reference)	Min.	Max.	Min.	Max.
2.5000-3.0 ACME-2G	2.5020	2.5000	2.4444	2.4424	2.2952	2.2939	2.2500	2.1567	2.3588	2.3601	2.4147	2.4167
2.5000-3.0 ACME-3G	2.5020	2.5000	2.4444	2.4424	2.3121	2.3113	2.2500	2.1567	2.3450	2.3458	2.4147	2.4167
2.5000-3.0 ACME-4G	2.5020	2.5000	2.4444	2.4424	2.3189	2.3181	2.2500	2.1567	2.3414	2.3422	2.4147	2.4167
2.7500-3.0 ACME-2G	2.7520	2.7500	2.6944	2.6924	2.5440	2.5427	2.5000	2.4067	2.6093	2.6106	2.6647	2.6667
2.7500-3.0 ACME-3G	2.7520	2.7500	2.6944	2.6924	2.5615	2.5607	2.5000	2.4067	2.5952	2.5960	2.6647	2.6667
2.7500-3.0 ACME-4G	2.7520	2.7500	2.6944	2.6924	2.5684	2.5676	2.5000	2.4067	2.5916	2.5924	2.6647	2.6667
3.0000-2.0 ACME-2G	3.0020	3.0000	2.9167	2.9147	2.7059	2.7044	2.6250	2.4900	2.7801	2.7816	2.8730	2.8750
3.0000-2.0 ACME-3G	3.0020	3.0000	2.9167	2.9147	2.7258	2.7248	2.6250	2.4900	2.7637	2.7647	2.8730	2.8750
3.0000-2.0 ACME-4G	3.0020	3.0000	2.9167	2.9147	2.7335	2.7325	2.6250	2.4900	2.7595	2.7605	2.8730	2.8750
3.5000-2.0 ACME-2G	3.5020	3.5000	3.4167	3.4147	3.2041	3.2026	3.1250	2.9900	3.2809	3.2824	3.3730	3.3750
3.5000-2.0 ACME-3G	3.5020	3.5000	3.4167	3.4147	3.2247	3.2237	3.1250	2.9900	3.2641	3.2651	3.3730	3.3750
3.5000-2.0 ACME-4G	3.5020	3.5000	3.4167	3.4147	3.2327	3.2317	3.1250	2.9900	3.2598	3.2608	3.3730	3.3750
4.0000-2.0 ACME-2G	4.0020	4.0000	3.9167	3.9147	3.7023	3.7008	3.6250	3.4900	3.7817	3.7832	3.8730	3.8750
4.0000-2.0 ACME-3G	4.0020	4.0000	3.9167	3.9147	3.7235	3.7225	3.6250	3.4900	3.7645	3.7655	3.8730	3.8750
4.0000-2.0 ACME-4G	4.0020	4.0000	3.9167	3.9147	3.7319	3.7309	3.6250	3.4900	3.7601	3.7611	3.8730	3.8750
4.5000-2.0 ACME-2G	4.5020	4.5000	4.4167	4.4147	4.2006	4.1991	4.1250	3.9900	4.2824	4.2839	4.3730	4.3750
4.5000-2.0 ACME-3G	4.5020	4.5000	4.4167	4.4147	4.2225	4.2215	4.1250	3.9900	4.2648	4.2658	4.3730	4.3750
4.5000-2.0 ACME-4G	4.5020	4.5000	4.4167	4.4147	4.2312	4.2302	4.1250	3.9900	4.2603	4.2613	4.3730	4.3750
5.0000-2.0 ACME-2G	5.0020	5.0000	4.9167	4.9147	4.6988	4.6973	4.6250	4.4900	4.7831	4.7846	4.8730	4.8750
5.0000-2.0 ACME-3G	5.0020	5.0000	4.9167	4.9147	4.7212	4.7202	4.6250	4.4900	4.7652	4.7662	4.8730	4.8750
5.0000-2.0 ACME-4G	5.0020	5.0000	4.9167	4.9147	4.7304	4.7294	4.6250	4.4900	4.7605	4.7615	4.8730	4.8750

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TABLE 21 LIMITING DIMENSIONS, GO AND NOT GO WORKING ADJUSTABLE RING GAGES FOR EXTERNAL THREADS, GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G

	Go External Working Ring					Not Go External Working Ring				
	Major Diameter, Clear	Pitch Diameter		Minor Diameter		Major Diameter, Clear	Pitch Diameter		Minor Diameter	
Designation	(Reference)	Max.	Min.	Max.	Min.	(Reference)	Max.	Min.	Max.	Min.
0.2500-16.0 ACME-2G	0.2600	0.2148	0.2142	0.1825	0.1815	0.2600	0.2049	0.2043	0.2041	0.2031
0.2500-16.0 ACME-3G	0.2600	0.2158	0.2153	0.1825	0.1815	0.2600	0.2114	0.2109	0.2041	0.2031
0.2500-16.0 ACME-4G	0.2600	0.2168	0.2163	0.1825	0.1815	0.2600	0.2138	0.2133	0.2041	0.2031
0.3125-14.0 ACME-2G	0.3225	0.2728	0.2722	0.2361	0.2351	0.3225	0.2620	0.2614	0.2600	0.2590
0.3125-14.0 ACME-3G	0.3225	0.2738	0.2733	0.2361	0.2351	0.3225	0.2690	0.2685	0.2600	0.2590
0.3125-14.0 ACME-4G	0.3225	0.2748	0.2743	0.2361	0.2351	0.3225	0.2715	0.2710	0.2600	0.2590
0.3750-12.0 ACME-2G	0.3850	0.3284	0.3278	0.2867	0.2857	0.3850	0.3167	0.3161	0.3135	0.3125
0.3750-12.0 ACME-3G	0.3850	0.3296	0.3290	0.2867	0.2857	0.3850	0.3244	0.3238	0.3135	0.3125
0.3750-12.0 ACME-4G	0.3850	0.3309	0.3303	0.2867	0.2857	0.3850	0.3274	0.3268	0.3135	0.3125
0.4375-12.0 ACME-2G	0.4475	0.3909	0.3903	0.3492	0.3482	0.4475	0.3789	0.3783	0.3760	0.3750
0.4375-12.0 ACME-3G	0.4475	0.3921	0.3915	0.3492	0.3482	0.4475	0.3868	0.3862	0.3760	0.3750
0.4375-12.0 ACME-4G	0.4475	0.3934	0.3928	0.3492	0.3482	0.4475	0.3868	0.3862	0.3760	0.3750
0.5000-10.0 ACME-2G	0.5100	0.4443	0.4436	0.3900	0.3880	0.5100	0.4313	0.4306	0.4270	0.4250
0.5000-10.0 ACME-3G	0.5100	0.4458	0.4452	0.3900	0.3880	0.5100	0.4400	0.4394	0.4270	0.4250
0.5000-10.0 ACME-4G	0.5100	0.4472	0.4466	0.3900	0.3880	0.5100	0.4432	0.4426	0.4270	0.4250
0.6250-8.0 ACME-2G	0.6350	0.5562	0.5554	0.4900	0.4880	0.6350	0.5416	0.5408	0.5332	0.5312
0.6250-8.0 ACME-3G	0.6350	0.5578	0.5571	0.4900	0.4880	0.6350	0.5513	0.5506	0.5332	0.5312
0.6250-8.0 ACME-4G	0.6350	0.5593	0.5586	0.4900	0.4880	0.6350	0.5549	0.5542	0.5332	0.5312
0.7500-6.0 ACME-2G	0.7600	0.6598	0.6589	0.5733	0.5713	0.7600	0.6433	0.6424	0.6270	0.6250
0.7500-6.0 ACME-3G	0.7600	0.6615	0.6608	0.5733	0.5713	0.7600	0.6541	0.6534	0.6270	0.6250
0.7500-6.0 ACME-4G	0.7600	0.6632	0.6625	0.5733	0.5713	0.7600	0.6581	0.6574	0.6270	0.6250
0.8750-6.0 ACME-2G	0.8850	0.7842	0.7833	0.6983	0.6963	0.8850	0.7672	0.7663	0.7520	0.7500
0.8750-6.0 ACME-3G	0.8850	0.7861	0.7854	0.6983	0.6963	0.8850	0.7785	0.7778	0.7520	0.7500
0.8750-6.0 ACME-4G	0.8850	0.7880	0.7873	0.6983	0.6963	0.8850	0.7827	0.7820	0.7520	0.7500
1.0000-5.0 ACME-2G	1.0100	0.8920	0.8910	0.7900	0.7880	1.0100	0.8736	0.8726	0.8520	0.8500
1.0000-5.0 ACME-3G	1.0100	0.8940	0.8932	0.7900	0.7880	1.0100	0.8857	0.8849	0.8520	0.8500
1.0000-5.0 ACME-4G	1.0100	0.8960	0.8952	0.7900	0.7880	1.0100	0.8903	0.8895	0.8520	0.8500
1.1250-5.0 ACME-2G	1.1350	1.0165	1.0155	0.9150	0.9130	1.1350	0.9977	0.9967	0.9770	0.9750
1.1250-5.0 ACME-3G	1.1350	1.0186	1.0178	0.9150	0.9130	1.1350	1.0102	1.0094	0.9770	0.9750
1.1250-5.0 ACME-4G	1.1350	1.0208	1.0200	0.9150	0.9130	1.1350	1.0150	1.0142	0.9770	0.9750
1.2500-5.0 ACME-2G	1.2600	1.1411	1.1401	1.0400	1.0380	1.2600	1.1220	1.1210	1.1020	1.1000
1.2500-5.0 ACME-3G	1.2600	1.1433	1.1425	1.0400	1.0380	1.2600	1.1347	1.1339	1.1020	1.1000
1.2500-5.0 ACME-4G	1.2600	1.1455	1.1447	1.0400	1.0380	1.2600	1.1396	1.1388	1.1020	1.1000
1.3750-4.0 ACME-2G	1.3850	1.2406	1.2395	1.1150	1.1130	1.3850	1.2197	1.2186	1.1895	1.1875
1.3750-4.0 ACME-3G	1.3850	1.2430	1.2422	1.1150	1.1130	1.3850	1.2335	1.2327	1.1895	1.1875
1.3750-4.0 ACME-4G	1.3850	1.2453	1.2445	1.1150	1.1130	1.3850	1.2388	1.2380	1.1895	1.1875

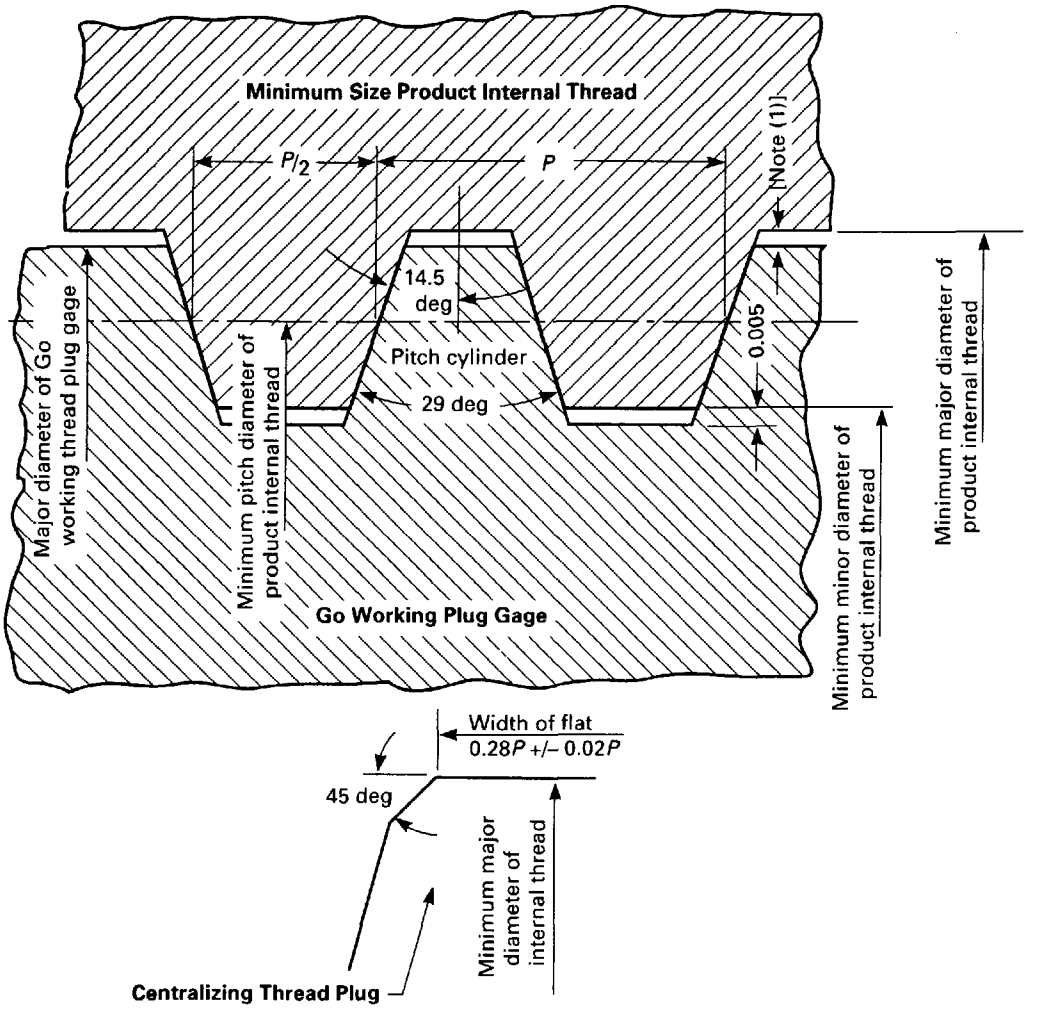
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TABLE 21 LIMITING DIMENSIONS, GO AND NOT GO WORKING ADJUSTABLE RING GAGES FOR EXTERNAL THREADS, GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2G, 3G, AND 4G (CONT'D)

	Go External Working Ring					Not Go External Working Ring				
	Major Diameter, Clear	Pitch Diameter		Minor Diameter		Major Diameter, Clear	Pitch Diameter		Minor Diameter	
Designation	(Reference)	Max.	Min.	Max.	Min.	(Reference)	Max.	Min.	Max.	Min.
1.5000-4.0 ACME-2G	1.5100	1.3652	1.3641	1.2400	1.2380	1.5100	1.3440	1.3429	1.3145	1.3125
1.5000-4.0 ACME-3G	1.5100	1.3677	1.3669	1.2400	1.2380	1.5100	1.3581	1.3573	1.3145	1.3125
1.5000-4.0 ACME-4G	1.5100	1.3701	1.3693	1.2400	1.2380	1.5100	1.3635	1.3627	1.3145	1.3125
1.7500-4.0 ACME-2G	1.7600	1.6145	1.6134	1.4900	1.4880	1.7600	1.5927	1.5916	1.5645	1.5625
1.7500-4.0 ACME-3G	1.7600	1.6171	1.6163	1.4900	1.4880	1.7600	1.6072	1.6064	1.5645	1.5625
1.7500-4.0 ACME-4G	1.7600	1.6198	1.6190	1.4900	1.4880	1.7600	1.6130	1.6122	1.5645	1.5625
2.0000-4.0 ACME-2G	2.0100	1.8637	1.8626	1.7400	1.7380	2.0100	1.8413	1.8402	1.8145	1.8125
2.0000-4.0 ACME-3G	2.0100	1.8665	1.8657	1.7400	1.7380	2.0100	1.8563	1.8555	1.8145	1.8125
2.0000-4.0 ACME-4G	2.0100	1.8693	1.8685	1.7400	1.7380	2.0100	1.8623	1.8615	1.8145	1.8125
2.2500-3.0 ACME-2G	2.2600	2.0713	2.0700	1.9047	1.8987	2.2600	2.0463	2.0450	2.0020	2.0000
2.2500-3.0 ACME-3G	2.2600	2.0743	2.0735	1.9047	1.8987	2.2600	2.0628	2.0620	2.0020	2.0000
2.2500-3.0 ACME-4G	2.2600	2.0773	2.0765	1.9047	1.8987	2.2600	2.0693	2.0685	2.0020	2.0000
2.5000-3.0 ACME-2G	2.5100	2.3207	2.3194	2.1567	2.1547	2.5100	2.2952	2.2939	2.2520	2.2500
2.5000-3.0 ACME-3G	2.5100	2.3238	2.3230	2.1567	2.1547	2.5100	2.3121	2.3113	2.2520	2.2500
2.5000-3.0 ACME-4G	2.5100	2.3270	2.3262	2.1567	2.1547	2.5100	2.3189	2.3181	2.2520	2.2500
2.7500-3.0 ACME-2G	2.7600	2.5700	2.5687	2.4067	2.4047	2.7600	2.5440	2.5427	2.5020	2.5000
2.7500-3.0 ACME-3G	2.7600	2.5734	2.5726	2.4067	2.4047	2.7600	2.5615	2.5607	2.5020	2.5000
2.7500-3.0 ACME-3G	2.7600	2.5767	2.5759	2.4067	2.4047	2.7600	2.5684	2.5676	2.5020	2.5000
3.0000-2.0 ACME-2G	3.0100	2.7360	2.7345	2.4900	2.4880	3.0100	2.7059	2.7044	2.6270	2.6250
3.0000-2.0 ACME-3G	3.0100	2.7395	2.7385	2.4900	2.4880	3.0100	2.7258	2.7248	2.6270	2.6250
3.0000-2.0 ACME-4G	3.0100	2.7430	2.7420	2.4900	2.4880	3.0100	2.7335	2.7325	2.6270	2.6250
3.5000-2.0 ACME-2G	3.5100	3.2350	3.2335	2.9900	2.9880	3.5100	3.2041	3.2026	3.1270	3.1250
3.5000-2.0 ACME-3G	3.5100	3.2388	3.2378	2.9900	2.9880	3.5100	3.2247	3.2237	3.1270	3.1250
3.5000-2.0 ACME-4G	3.5100	3.2425	3.2415	2.9900	2.9880	3.5100	3.2327	3.2317	3.1270	3.1250
4.0000-2.0 ACME-2G	4.0100	3.7340	3.7325	3.4900	3.4880	4.0100	3.7023	3.7008	3.6270	3.6250
4.0000-2.0 ACME-3G	4.0100	3.7380	3.7370	3.4900	3.4880	4.0100	3.7235	3.7225	3.6270	3.6250
4.0000-2.0 ACME-4G	4.0100	3.7420	3.7410	3.4900	3.4880	4.0100	3.7319	3.7309	3.6270	3.6250
4.5000-2.0 ACME-2G	4.5100	4.2330	4.2315	3.9900	3.9880	4.5100	4.2006	4.1991	4.1270	4.1250
4.5000-2.0 ACME-3G	4.5100	4.2373	4.2363	3.9900	3.9880	4.5100	4.2225	4.2215	4.1270	4.1250
4.5000-2.0 ACME-4G	4.5100	4.2415	4.2405	3.9900	3.9880	4.5100	4.2312	4.2302	4.1270	4.1250
5.0000-2.0 ACME-2G	5.0100	4.7319	4.7304	4.4900	4.4880	5.0100	4.6988	4.6973	4.6270	4.6250
5.0000-2.0 ACME-3G	5.0100	4.7364	4.7354	4.4900	4.4880	5.0100	4.7212	4.7202	4.6270	4.6250
5.0000-2.0 ACME-4G	5.0100	4.7409	4.7399	4.4900	4.4880	5.0100	4.7304	4.7294	4.6270	4.6250

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NOTE:
(1) For greater than 10 threads/in., 0.0025 in.; for 10 threads/in. and less, 0.0050 in.

FIG. 19 MAXIMUM-MATERIAL GO FUNCTIONAL LIMIT FOR INTERNAL THREAD

4.6.4 Solid Thread Setting Go Ring Gage

(a) Purpose and Use. Thread setting ring gage is used for setting internal thread indicating gage.

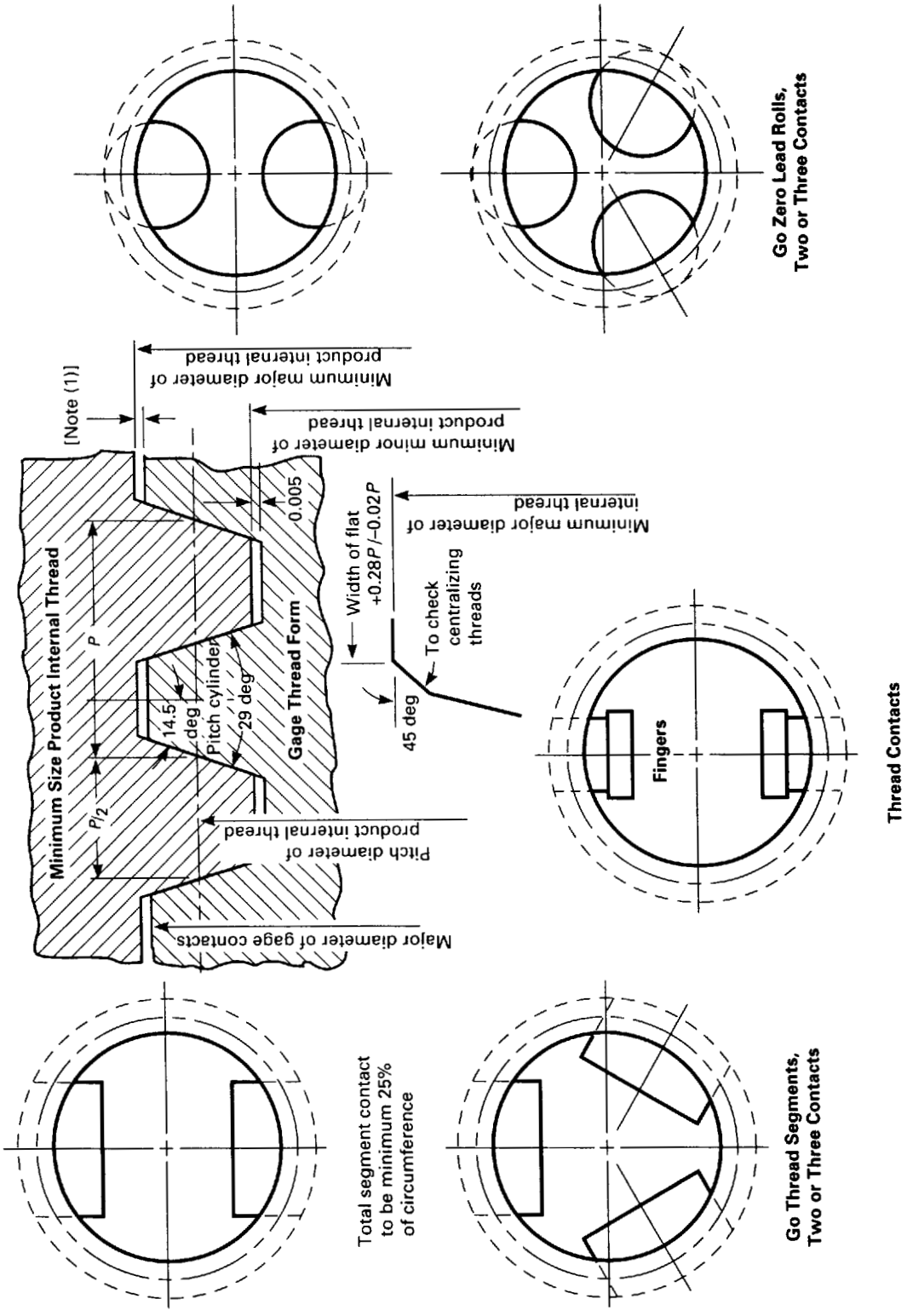
(b) Design. The minor diameter of the Go setting ring gage is equal to the minimum minor diameter of the internal thread, with a gage tolerance plus. The pitch diameter shall be equal to the minimum (basic) pitch diameter of the internal thread, with a tolerance plus. The major diameter shall be cleared as shown in Fig. 24. The feather edge at both ends of the thread ring gage shall be removed to obtain a full-thread blunt start. In all cases, measured pitch diameter shall be marked on the gage or on an attached tag. It is recommended that indicating gages be set from Go set ring gages, with setting adjusted for measured pitch diameter. See Appendix F for measurement of internal pitch diameter.

A Go and Not Go threaded check plug gages for internal pitch diameter may be used to establish the pitch diameter of the solid setting ring gage. See Appendix G3.

(c) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18).

4.6.5 Go Plain Plug Gage for Minor Diameter of Internal Thread. The diameter of the Go plain plug gage, shown in Fig. 25, shall be the same as the minimum minor diameter of the internal thread. The

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NOTE:
(1) For greater than 10 threads/in., 0.0025 in.; for 10 threads/in. and less, 0.0050 in.

FIG. 20 INDICATING THREAD GAGES — MAXIMUM-MATERIAL GO FUNCTIONAL SIZE FOR INTERNAL THREAD

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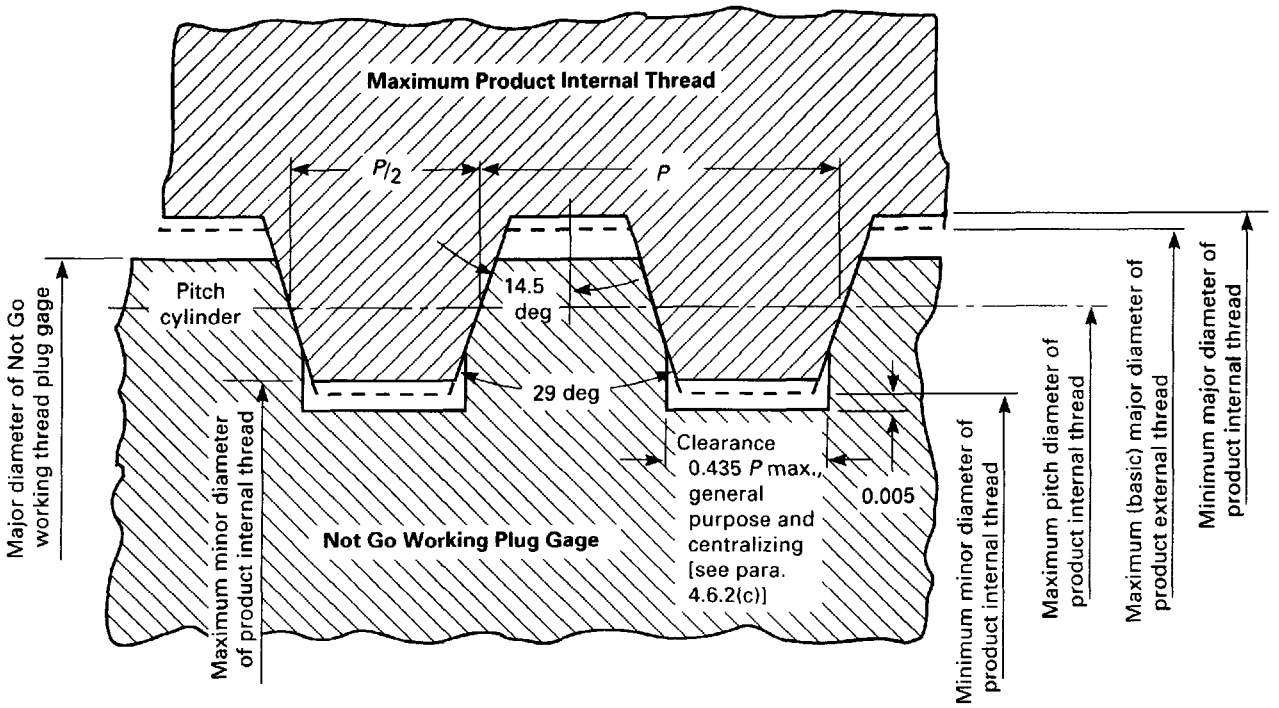


FIG. 21 NOT GO FUNCTIONAL DIAMETER LIMIT FOR INTERNAL THREAD

gage tolerance shall be plus (see Table 23). The gage length shall be in accordance with ASME B47.1 (see Table 18).

4.6.6 Not Go Plain Plug Gage for Minor Diameter of Internal Thread. The diameter of the Not Go plain plug gage shall be the same as the maximum minor diameter of the internal thread. The gage tolerance shall be minus (see Table 23). The gage length shall be in accordance with ASME B47.1 (see Table 18).

4.6.7 Circular Runout Indicating Gage

(a) Purpose and Use. The indicating gage inspects the runout of the minor cylinder to the pitch cylinder of the product internal thread. Readings indicate the position of the product minor diameter to the pitch diameter within the specified tolerance.

(b) Design. The thread-type indicating gage has three contacts, one plain and two threaded, spaced 120 deg, or two contacts, spaced 180 deg [see Fig. 26, sketch (a)].

The ball-type indicating gage has two balls on one contact engaging the threads and one contact has a plain prism-shaped finger 180 deg apart from the ball contact [see Fig. 26, sketch (b)].

The indicating gage is set by the Go setting ring gage (see para. 4.6.4) with plain gaging contact on minor diameter of the thread setting ring gage and the thread contacts on pitch diameter of the thread ring gage.

(c) Thread Form. The specifications for thread form on the cone and vee segments and rolls are summarized in Fig. 26. Plain contact has bearing on minor diameter of product thread. Balls are "best size" contacting thread at pitch cylinder.

4.6.8 Differential Gaging for Internal Thread. The differential gaging principle is explained in para. 4.5.10 for external threads. It is similar for internal threads and is illustrated in Fig. 27. The (Z) reading is taken with the maximum-material Go functional indicating gage illustrated in Fig. 20. The (Y) reading is taken with the full-form single cone and vee indicating gage illustrated in Fig. 28. The (X) reading is taken with the pitch diameter indicating gage illustrated in Fig. 22.

(a) Single element lead differential gaging reading is (Y-Z).

(b) Single element angle differential gaging reading is (X-Y).

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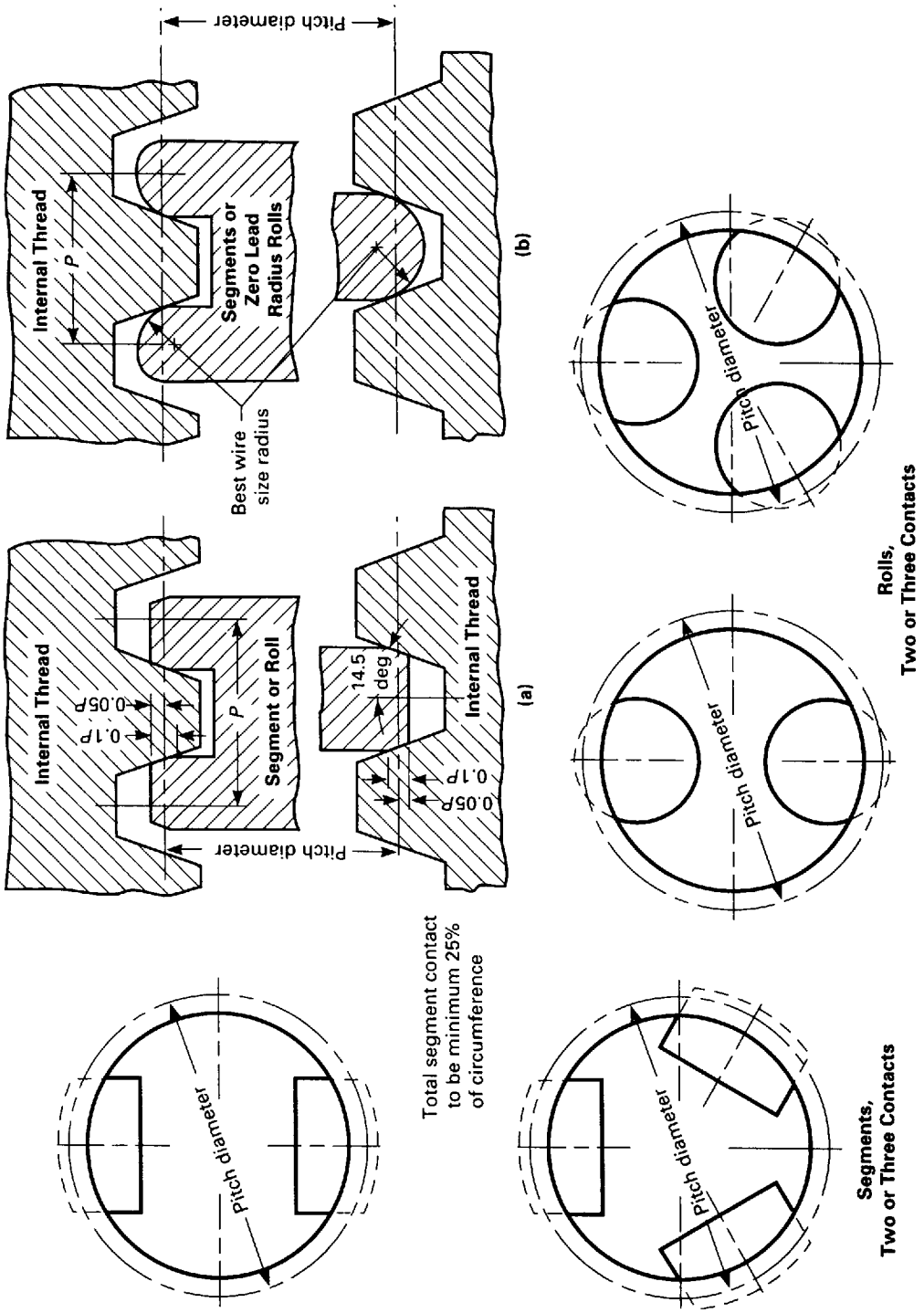


FIG. 22 INDICATING THREAD GAGES — MINIMUM-MATERIAL PITCH DIAMETER LIMIT AND SIZE, CONE AND VEE, FOR INTERNAL THREAD

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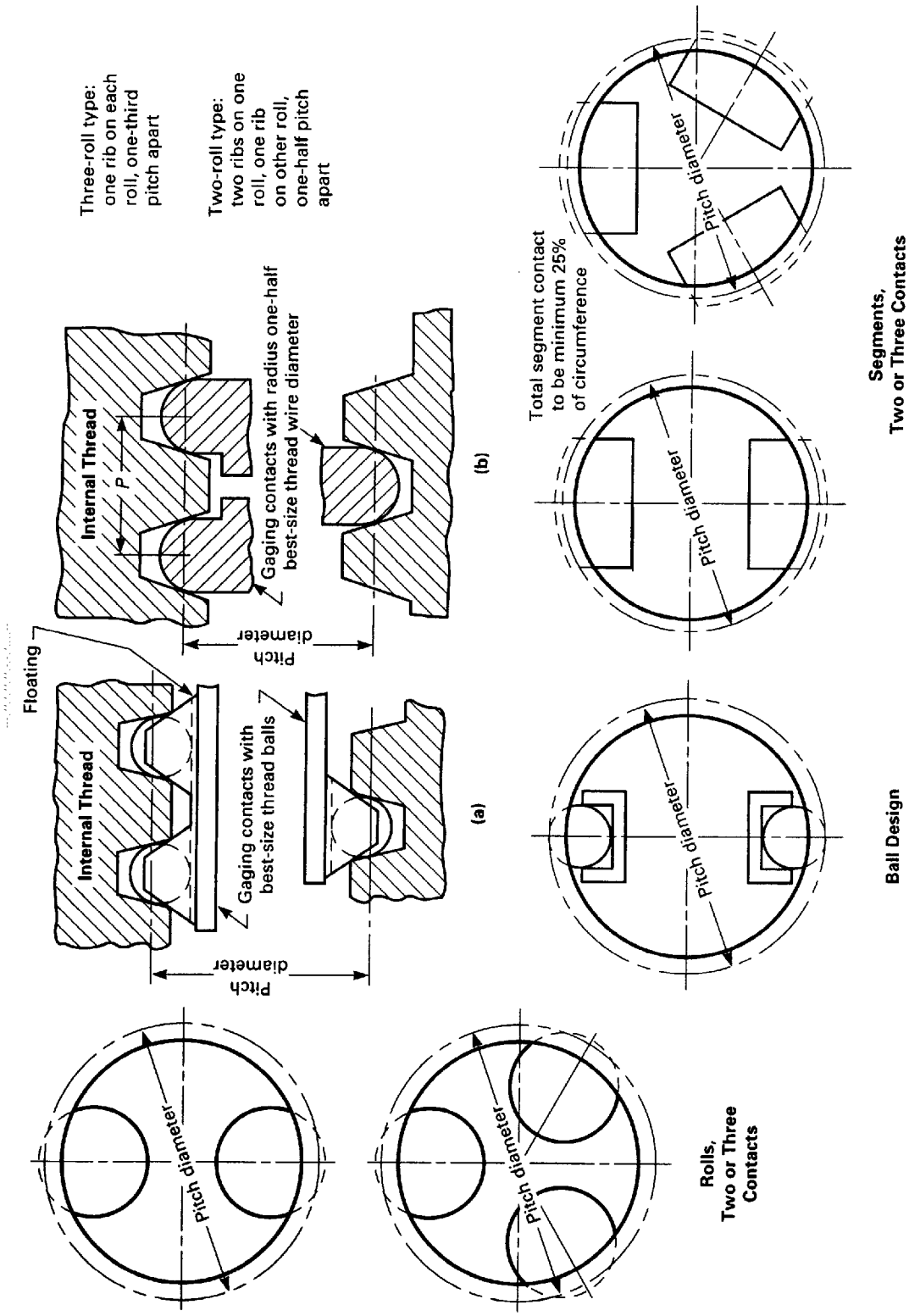


FIG. 23 INDICATING THREAD GAGES — MINIMUM-MATERIAL THREAD GROOVE DIAMETER LIMIT AND SIZE, BALL AND RADIUS, FOR INTERNAL THREAD

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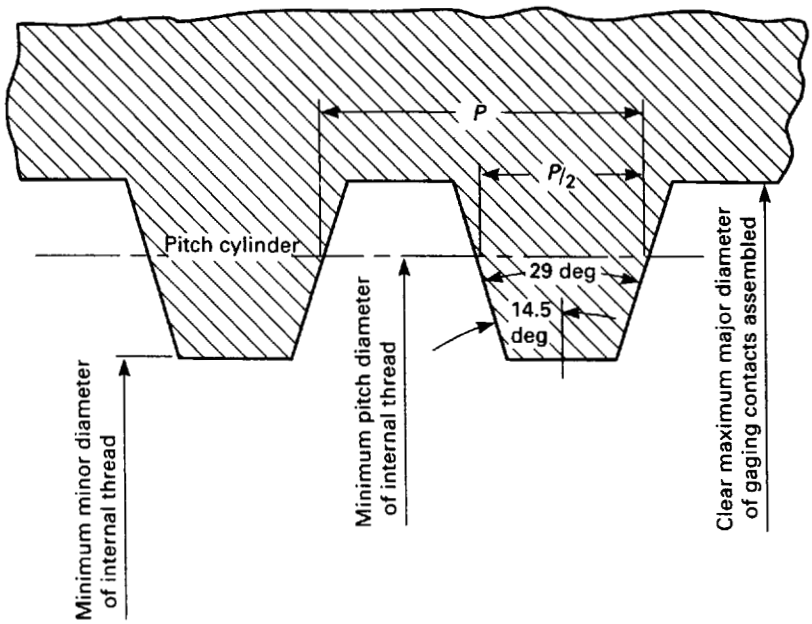


FIG. 24 THREAD FORM OF SOLID THREAD SETTING RING GAGE FOR INTERNAL THREAD

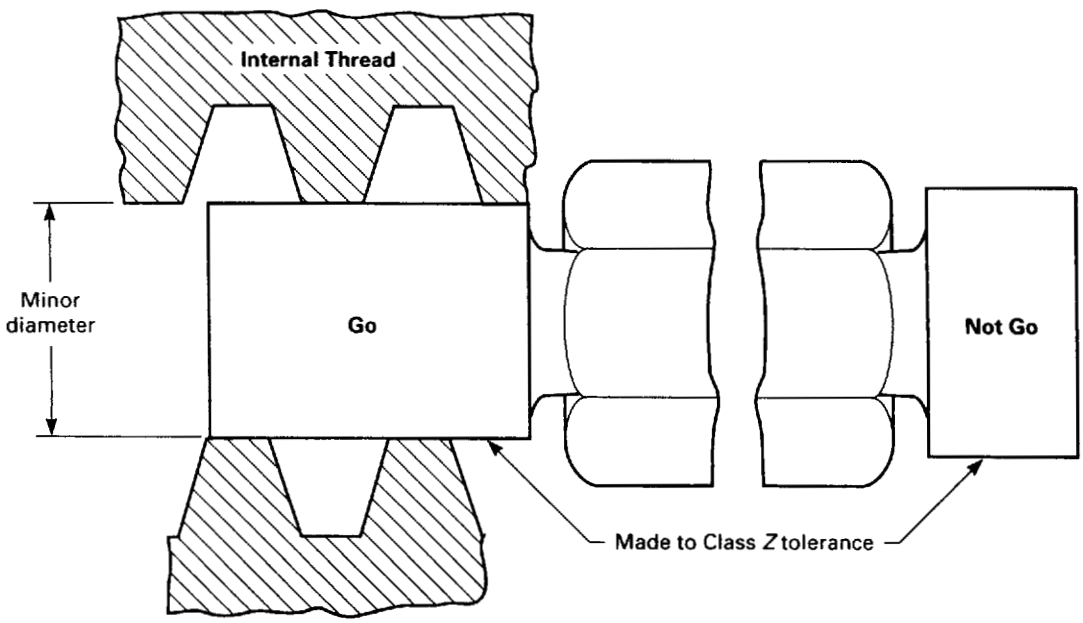


FIG. 25 MINOR DIAMETER LIMIT — CYLINDRICAL PLUG GAGES FOR INTERNAL THREAD

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TABLE 22 LIMITING DIMENSIONS, SOLID-SETTING THREAD RING GAGES FOR INTERNAL THREAD INDICATING GAGES, SINGLE-START ACME SCREW THREADS

	Internal Setting Ring				
	Minor Diameter		Pitch Diameter		Major Diameter, Min. Clear
Designation	Min.	Max.	Min.	Max.	Reference
0.2500-16.0 ACME-4G	0.1875	0.1885	0.2188	0.2194	0.2600
0.3125-14.0 ACME-4G	0.2411	0.2421	0.2768	0.2774	0.3225
0.3750-12.0 ACME-4G	0.2917	0.2927	0.3333	0.3339	0.3850
0.4375-12.0 ACME-4G	0.3542	0.3452	0.3958	0.3964	0.4475
0.5000-10.0 ACME-4G/C	0.4000	0.4020	0.4500	0.4506	0.5200
0.6250-8.0 ACME-4G/C	0.5000	0.5020	0.5625	0.5632	0.6450
0.7500-6.0 ACME-4G/C	0.5833	0.5853	0.6667	0.6674	0.7700
0.8750-6.0 ACME-4G/C	0.7083	0.7103	0.7917	0.7924	0.8950
1.0000-5.0 ACME-4G/C	0.8000	0.8020	0.9000	0.9008	1.0200
1.1250-5.0 ACME-4G/C	0.9250	0.9270	1.0250	1.0258	1.1450
1.2500-5.0 ACME-4G/C	1.0500	1.0520	1.1500	1.1508	1.2700
1.3750-4.0 ACME-4G/C	1.1250	1.1250	1.2500	1.2508	1.3950
1.5000-4.0 ACME-4G/C	1.2500	1.2520	1.3750	1.3758	1.5000
1.7500-4.0 ACME-4G/C	1.5000	1.5020	1.6250	1.6258	1.7700
2.0000-4.0 ACME-4G/C	1.7500	1.7520	1.8750	1.8758	2.0200
2.2500-3.0 ACME-4G/C	1.9167	1.9187	2.0833	2.0841	2.2700
2.5000-3.0 ACME-4G/C	2.1667	2.1687	2.3333	2.3341	2.5200
2.7500-3.0 ACME-4G/C	2.4167	2.4187	2.5833	2.5841	2.7700
3.0000-2.0 ACME-4G/C	2.5000	2.5020	2.7500	2.7510	3.0200
3.5000-2.0 ACME-4G/C	3.0000	3.0020	3.2500	3.2510	3.5200
4.0000-2.0 ACME-4G/C	3.5000	3.5020	3.7500	3.7510	4.0200
4.5000-2.0 ACME-4G/C	4.0000	4.0020	4.2500	4.2510	4.5200
5.0000-2.0 ACME-4G/C	4.5000	4.5020	4.7500	4.7510	5.0200

TABLE 23 PLAIN GAGE TOLERANCES

Size Range		Class Z Tolerances for Plain Gages
Above	To and Including	
0.150	0.825	0.00010
0.825	1.510	0.00012
1.510	2.510	0.00016
2.510	4.510	0.00020
4.510	6.510	0.00025

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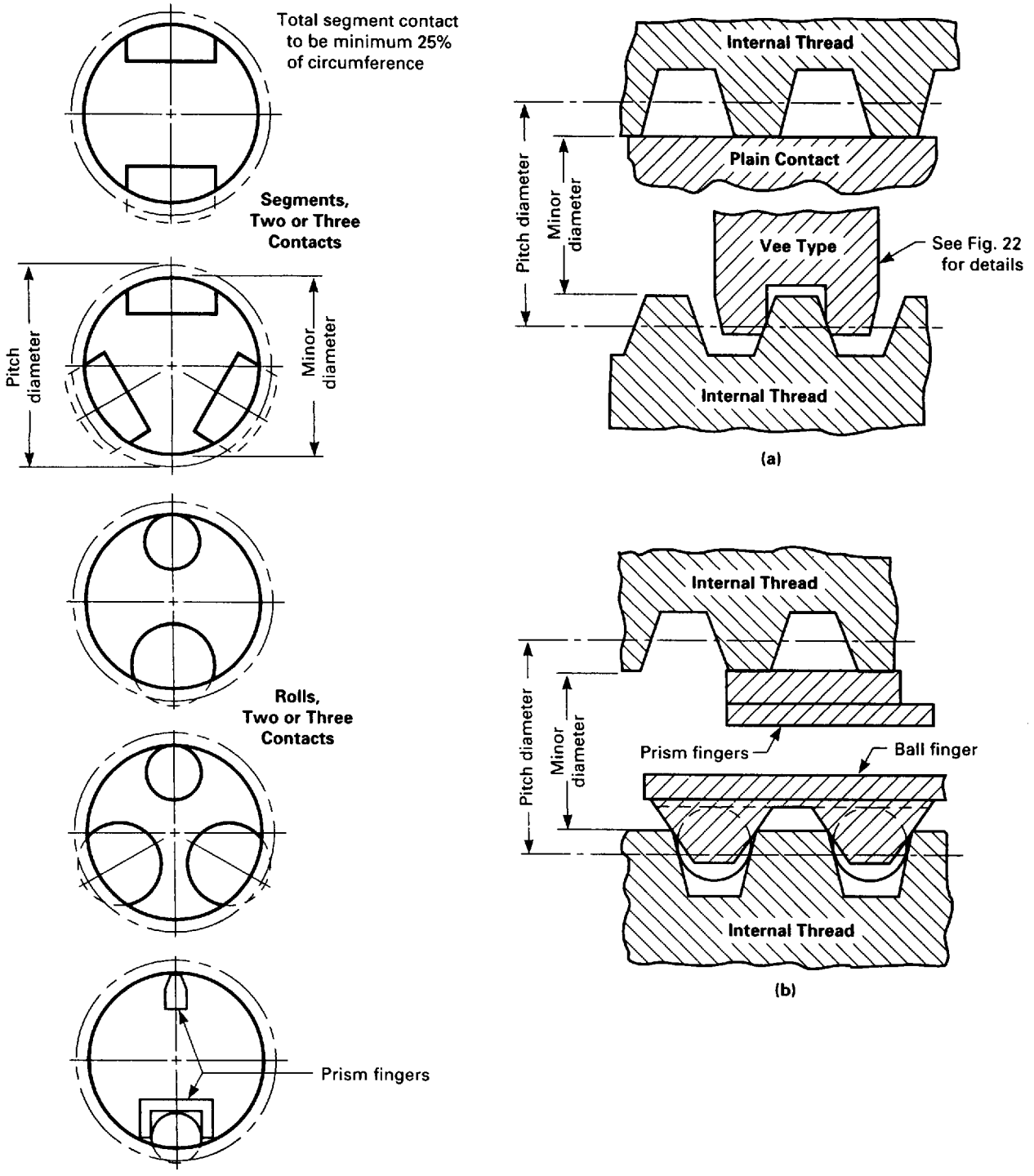
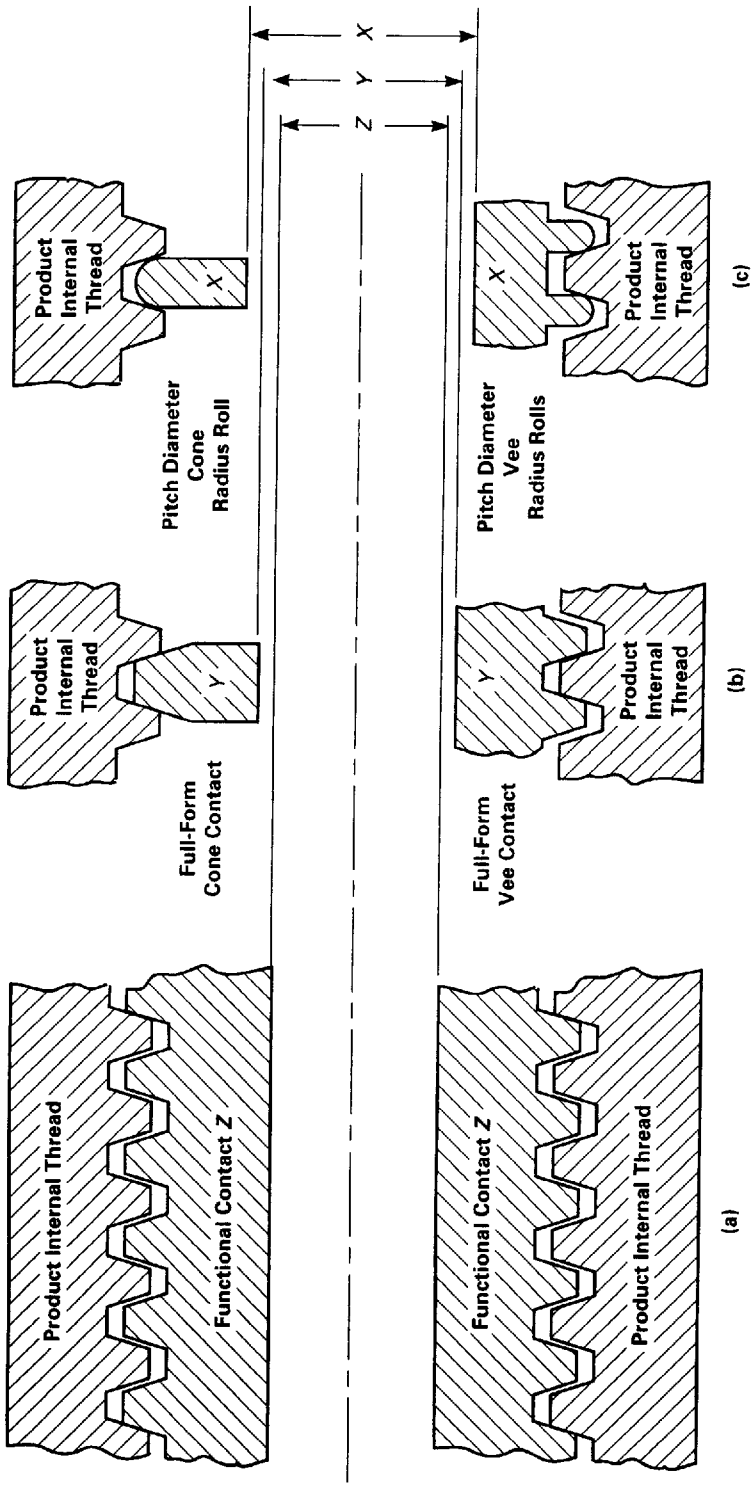


FIG. 26 INDICATING THREAD GAGES — DIAMETER RUNOUT, MINOR TO PITCH DIAMETER, FOR INTERNAL THREAD

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X = indicator reading for (minimum-material) pitch diameter and used for taper, straightness, and roundness measurements
Y = indicator reading used for lead differential analysis
Z = indicator reading for (maximum-material) functional size and used for lead differential analysis
X – Z = cumulative form differential analysis $\Delta D_2 c$
Y – Z = individual element analysis for lead differential $\Delta D_2 \lambda$
X – Y = individual analysis for angle differential $\Delta D_2 \alpha$

FIG. 27 DIFFERENTIAL GAGING FOR INTERNAL THREAD

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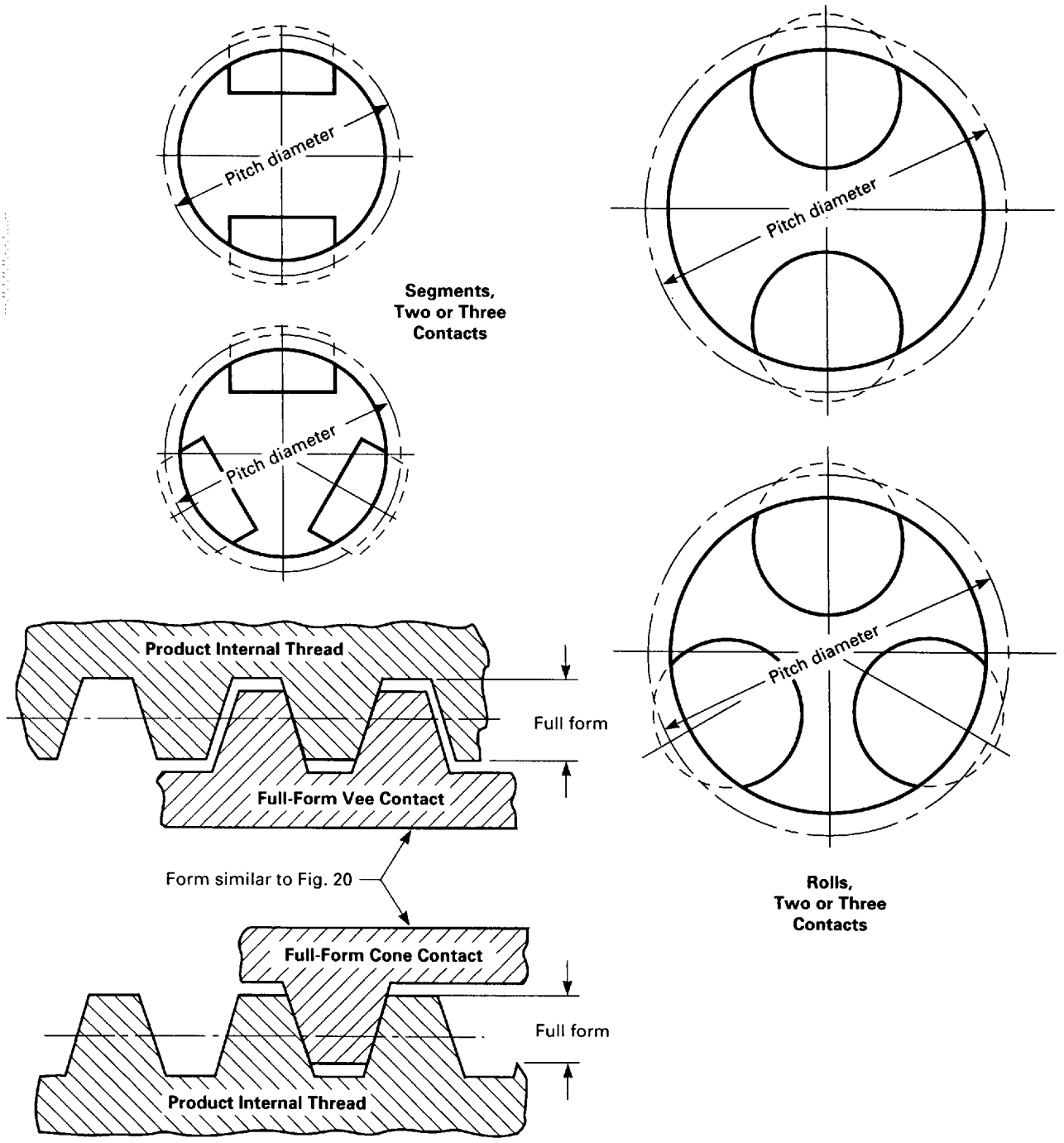


FIG. 28 SINGLE-THREAD, FULL-FORM INDICATING GAGES — CONE AND VEE HELICAL SEGMENTS AND ZERO LEAD ROLLS FOR INTERNAL THREAD

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(c) Cumulative form differential gaging reading is (X-Z).

4.6.9 Minor Diameter Indicating Gage. Gages are made to the individual gage manufacturer's design with gaging contacts (segments or rolls) at 120 deg or 180 deg apart (see Fig. 29). Gage is set to cylindrical ring gage or a gage block gap where appropriate.

4.6.10 Major Diameter Indicating Gage

(a) Purpose and Use. This measurement is to verify that the clearance between the internal and external thread major diameter is correct.

(b) Design. Gages are made to the individual manufacturer's designs (see Fig. 30). The width of flat on the thread crest contact shall be less than (*Frn*) to avoid interference with corner radii due to tool wear. The included angle on the indicating gage thread contact should be 10 deg or smaller.

(c) Indicating Gage Setting. The indicating gage is set to the plain ring gage.

4.7 ASME B47.1 Gage Blanks

See Appendix G1 for Go gage compensation. Table 18 is also provided for Go gage blank length preference.

5 GAGING FOR CENTRALIZING ACME THREADS

This section does not repeat information contained in section 4 on gages for general purpose Acme threads. See para. 4 for gaging system description, paras. 4.1 and 4.2 for measurement uncertainty, and para. 4.3 for gage blanks.

5.1 Gage Tolerances

Tolerances for the thread elements of Go and Not Go thread gages for centralizing Acme threads are given in Table 24.

5.1.1 Tolerances on Pitch Diameter. The pitch diameter tolerances for gages for Classes 2C, 3C, and 4C, external and internal threads, are given in Table 24.

See Appendix E4 or F4 for wire or ball measurement of pitch diameter on gages with large lead angles, approximately 5 deg and larger.

5.1.2 Tolerances on Major and Minor Diameters. The tolerances for the major diameter of thread plug and minor diameter of thread ring gages for centralizing Acme thread gages are given in Table 24.

5.1.3 Tolerances on Lead. The variation in lead of all Acme thread gages for Classes 3C and 4C product shall not exceed 0.0002 in. between any two threads not farther than 1 in. apart. However, the lead variation shall not exceed 0.0003 in. for gages with length over 1 in. through 3 in.; or 0.0004 for gages with length over 3 in. through 5 in.; or 0.0006 in. for gages with a length over 5 in. For gages for Class 2C product, 0.0001 in. shall be added to the above values.

5.1.4 Tolerances on Flank Angle of Thread. The tolerances shall apply to both the flank angle and the optical projected flank angle viewed normal to the thread axis (see Appendix G2).

The tolerances on angle of thread, as specified in Table 24, for the various pitches, are tolerances on one-half of the included angle. This insures that the bisector of the included angle will be perpendicular to the axis of the thread within proper limits. The equivalent deviation from true thread form caused by such irregularities as convex or concave sides of thread, or slight projections on the thread form, should not exceed the tolerances permitted on angle of thread. The flank angle tolerances apply to the actual flank contact length between gages or between gage and product.

5.1.5 Functional Size. Same as para. 4.1.5.

5.1.6 End, Partial, or Entry Threads. The partial or incomplete entry/end threads of all single lead centralizing Acme thread gages above 0.500 in. shall be removed by convolution to a full form. Multiple-start gages and gages for sizes 0.5000 in. and smaller may be chamfered.

5.2 Gages for External Centralizing Acme Thread

For limits of size for Go and Not Go setting plug gages for external centralizing Acme thread gages, see Table 25. For Go and Not Go working ring gages for external centralizing threads, see Table 26.

5.2.1 Go Thread Ring or Indicating Gage

(a) Major Diameter. The major diameter of the Go ring gage or indicating gage contacts shall clear the maximum major diameter of the external part by 0.010 in. minimum for new gages. For recalibration of used gages, the ring should have sufficient clearance at the major diameter to clear the full form of the setting gage. The determination of this clearance is best facilitated by the use of a truncated setting plug rather than a full-form setting plug gage.

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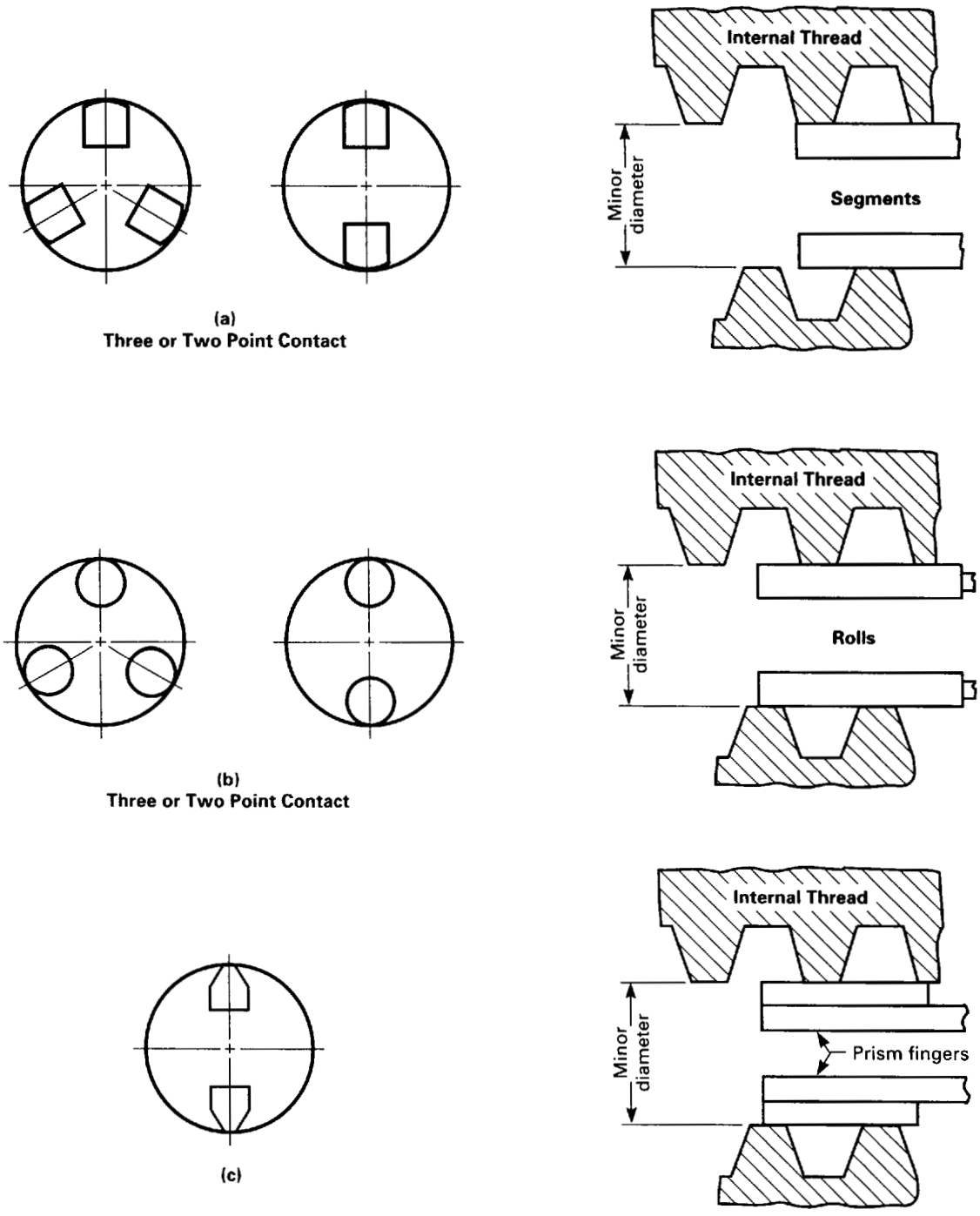


FIG. 29 INDICATING PLAIN DIAMETER GAGES — MAXIMUM/MINIMUM MINOR DIAMETER LIMIT AND SIZE FOR INTERNAL THREAD

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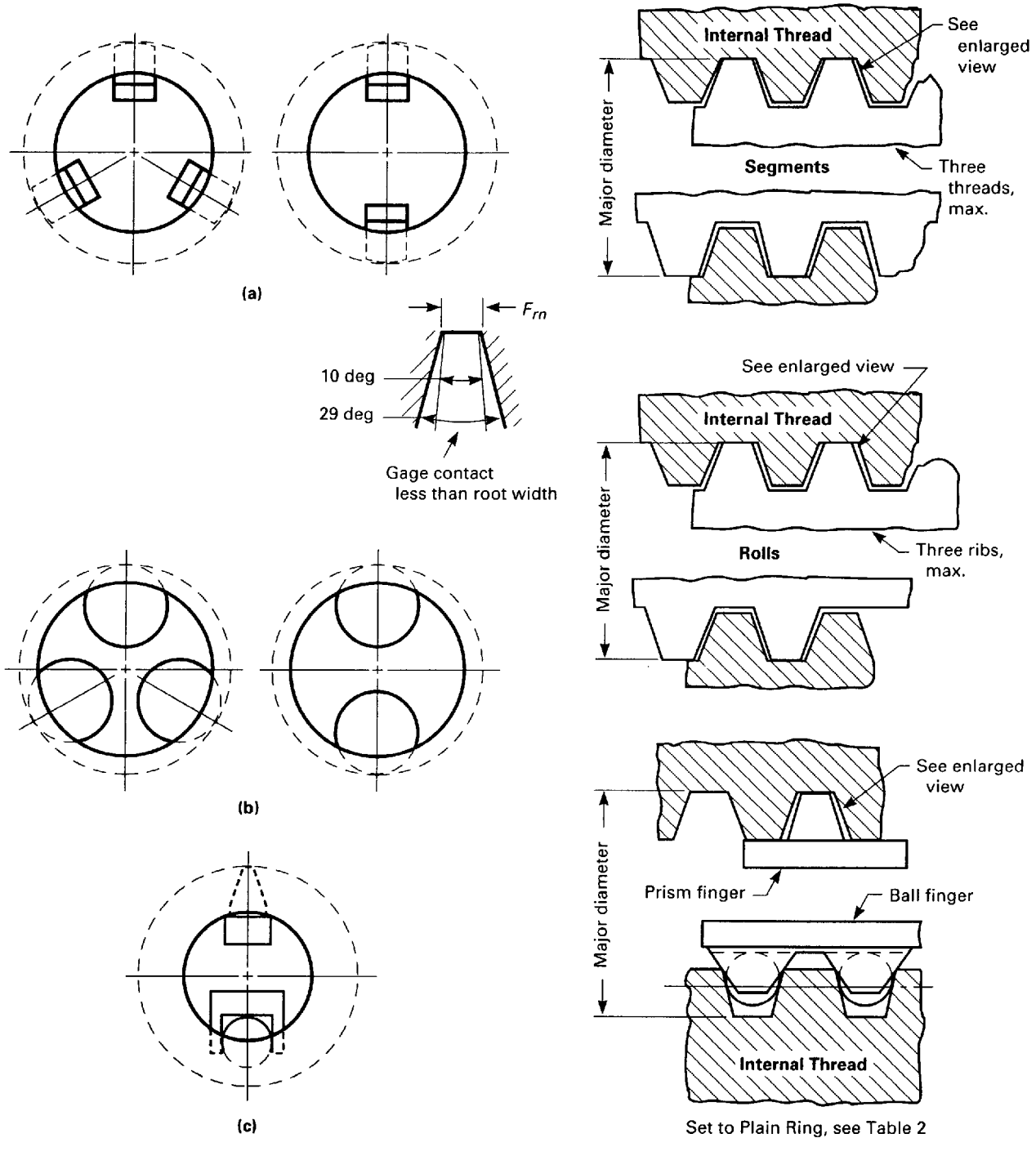


FIG. 30 INDICATING DIAMETER GAGES — MAXIMUM/MINIMUM MAJOR DIAMETER LIMIT AND SIZE FOR INTERNAL THREAD

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TABLE 24 TOLERANCES FOR GO AND NOT GO THREAD GAGES, WORKING AND SETTING, FOR CENTRALIZING SINGLE-START ACME SCREW THREADS (0.250 in. Through 5.000 in.)

Threads/in. [Note (1)]	Tolerance on Pitch Diameters [Note (2)]		Tolerance on Thread Plug Major Diameters		Tolerance on Minor Diameter of Go and Not Go Thread Ring Gages	Tolerance on Half-Angle of Thread ±	
	Class 2C	Classes 3C and 4C	Go Working Thread Plug/ Special Not Go Working Plug for Major Diameter of Internal Thread	Go and Not Go Full-Form and Truncated Setting Thread Plug and Not Go Working Plug Gages		deg	min
10	0.0007	0.0006	0.00020	0.002	0.002	0	10
8	0.0008	0.0007	0.00020	0.002	0.002	0	8
6	0.0009	0.0007	0.00020	0.002	0.002	0	8
5	0.0010	0.0008	0.00020	0.002	0.002	0	8
4	0.0011	0.0008	0.00025	0.002	0.002	0	8
3	0.0013	0.0008	0.00030	0.002	0.002	0	6
$2\frac{1}{2}$	0.0014	0.0009	0.00040	0.002	0.002	0	6
2	0.0015	0.0010	0.00040	0.002	0.002	0	6
$1\frac{1}{3}$	0.0018	0.0010	0.00050	0.002	0.002	0	5
$1\frac{1}{2}$	0.0018	0.0010	0.00050	0.002	0.002	0	5
1	0.0021	0.0010	0.00050	0.002	0.002	0	5

NOTES:
(1) Intermediate pitches take the tolerances of the next coarser pitch listed in this Table.
(2) These pitch diameter tolerances for thread gages are not cumulative; that is, they do not include tolerances on lead and on half-angle.

NOTE: Threads/in. finer than 16 may not be practical or possible to achieve 0.010 in. minimum clearance. The clearance in the ring at the major diameter is acceptable if the ring can be properly set on a truncated setting plug and the ring clears the full-form major diameter on the setting plug.

(b) Pitch Diameter. The size of a Go thread ring is determined by its fit on the maximum-material limit thread setting plug gage. The indicating gage is set to the full-form Go thread setting plug gage.

(c) Minor Diameter. The minor diameter shall be less than the minimum minor diameter of the internal product thread by the amount of the pitch diameter allowance given in Table 9. The tolerance shall be minus.

(d) Length. When no special length of engagement is specified on the procurement contract, use standard gaging blanks per ASME B47.1 (see Table 18). The length should approximate 3 pitches for single-start threads. See para. 4.7 for LE greater than ring gage length.

(e) Go maximum-material ring and indicating gage are illustrated in Figs. 7 and 8, respectively.

5.2.2 Maximum-Material Limit Thread Setting Plug for Go Thread Ring or Indicating Gages

(a) Major Diameter. The major diameter of the full-form portion of the maximum-material limit thread setting plug gage shall be the same as the maximum major diameter of the external product thread. The gage tolerance shall be plus. The major diameter of the truncated portion of the thread setting plug gage shall be smaller by one-third of the basic thread depth ($P/6$) than the maximum major diameter of the external thread. The gage tolerance shall be minus.

(b) Pitch Diameter. The pitch diameter of the thread setting plug shall be the same as the maximum pitch diameter of the external thread. The gage tolerance shall be minus. In all cases, measured pitch diameter shall be marked on the gage or an attached tag. It is recommended that indicating gages be set from Class 3G/3C/4G/4C Go set plug gages, adjusting for measured pitch diameter.

(c) Minor Diameter. The minor diameter shall be cleared below the minimum minor diameter of the Go ring and indicating gage.

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TABLE 25 LIMITING DIMENSIONS, GO AND NOT GO SETTING PLUG GAGES FOR ADJUSTABLE RING AND INDICATING GAGES FOR EXTERNAL THREAD, CENTRALIZING SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C

	Go External Setting Plug							Not Go External Setting Plug						
	Major Diameter				Pitch Diameter		Minor Diameter, Clear (Reference)	Major Diameter				Pitch Diameter		Minor Diameter, Clear (Reference)
	Full Form		Truncated					Full Form		Truncated				
Designation	Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.	Max.	Min.	Max.	Min.	
0.5000-10.0 ACME-2C	0.5020	0.5000	0.4833	0.4813	0.4443	0.4436	0.4023	0.5020	0.5000	0.4833	0.4813	0.4313	0.4306	0.4250
0.5000-10.0 ACME-3C	0.5020	0.5000	0.4833	0.4813	0.4458	0.4452	0.4038	0.5020	0.5000	0.4833	0.4813	0.4400	0.4394	0.4250
0.5000-10.0 ACME-4C	0.5020	0.5000	0.4833	0.4813	0.4472	0.4466	0.4052	0.5020	0.5000	0.4833	0.4813	0.4432	0.4426	0.4250
0.6250-8.0 ACME-2C	0.6270	0.6250	0.6042	0.6022	0.5562	0.5554	0.5042	0.6270	0.6250	0.6042	0.6022	0.5416	0.5408	0.5312
0.6250-8.0 ACME-3C	0.6270	0.6250	0.6042	0.6022	0.5578	0.5571	0.5058	0.6270	0.6250	0.6042	0.6022	0.5513	0.5506	0.5312
0.6250-8.0 ACME-4C	0.6270	0.6250	0.6042	0.6022	0.5593	0.5586	0.5072	0.6270	0.6250	0.6042	0.6022	0.5549	0.5542	0.5312
0.7500-6.0 ACME-2C	0.7520	0.7500	0.7222	0.7202	0.6598	0.6589	0.5911	0.7520	0.7500	0.7222	0.7202	0.6433	0.6424	0.6250
0.7500-6.0 ACME-3C	0.7520	0.7500	0.7222	0.7202	0.6615	0.6608	0.5928	0.7520	0.7500	0.7222	0.7202	0.6541	0.6534	0.6250
0.7500-6.0 ACME-4C	0.7520	0.7500	0.7222	0.7202	0.6632	0.6625	0.5945	0.7520	0.7500	0.7222	0.7202	0.6581	0.6574	0.6250
0.8750-6.0 ACME-2C	0.8770	0.8750	0.8472	0.8452	0.7842	0.7833	0.7155	0.8770	0.8750	0.8472	0.8452	0.7672	0.7663	0.7500
0.8750-6.0 ACME-3C	0.8770	0.8750	0.8472	0.8452	0.7861	0.7854	0.7174	0.8770	0.8750	0.8472	0.8452	0.7785	0.7778	0.7500
0.8750-6.0 ACME-4C	0.8770	0.8750	0.8472	0.8452	0.7880	0.7873	0.7193	0.8770	0.8750	0.8472	0.8452	0.7827	0.7820	0.7500
1.0000-5.0 ACME-2C	1.0020	1.0000	0.9667	0.9647	0.8920	0.8910	0.8100	1.0020	1.0000	0.9667	0.9647	0.8736	0.8726	0.8500
1.0000-5.0 ACME-3C	1.0020	1.0000	0.9667	0.9647	0.8940	0.8932	0.8120	1.0020	1.0000	0.9667	0.9647	0.8857	0.8849	0.8500
1.0000-5.0 ACME-4C	1.0020	1.0000	0.9667	0.9647	0.8960	0.8952	0.8140	1.0020	1.0000	0.9667	0.9647	0.8903	0.8895	0.8500
1.1250-5.0 ACME-2C	1.1270	1.1250	1.0917	1.0897	1.0165	1.0155	0.9345	1.1270	1.1250	1.0917	1.0897	0.9977	0.9967	0.9750
1.1250-5.0 ACME-3C	1.1270	1.1250	1.0917	1.0897	1.0186	1.0178	0.9366	1.1270	1.1250	1.0917	1.0897	1.0102	1.0094	0.9750
1.1250-5.0 ACME-4C	1.1270	1.1250	1.0917	1.0897	1.0208	1.0200	0.9406	1.1270	1.1250	1.0917	1.0897	1.0150	1.0142	0.9750
1.2500-5.0 ACME-2C	1.2520	1.2500	1.2167	1.2147	1.1411	1.1401	0.9591	1.2520	1.2500	1.2167	1.2147	1.1220	1.1210	1.1000
1.2500-5.0 ACME-3C	1.2520	1.2500	1.2167	1.2147	1.1433	1.1425	1.0613	1.2520	1.2500	1.2167	1.2147	1.1347	1.1339	1.1000
1.2500-5.0 ACME-4C	1.2520	1.2500	1.2167	1.2147	1.1455	1.1447	1.0635	1.2520	1.2500	1.2167	1.2147	1.1396	1.1388	1.1000
1.3750-4.0 ACME-2C	1.3770	1.3750	1.3333	1.3313	1.2406	1.2395	1.1386	1.3770	1.3750	1.3333	1.3313	1.2197	1.2186	1.1875
1.3750-4.0 ACME-3C	1.3770	1.3750	1.3333	1.3313	1.2430	1.2422	1.1410	1.3770	1.3750	1.3333	1.3313	1.2335	1.2327	1.1875
1.3750-4.0 ACME-4C	1.3770	1.3750	1.3333	1.3313	1.2453	1.2445	1.1433	1.3770	1.3750	1.3333	1.3313	1.2388	1.2380	1.1875

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TABLE 25 LIMITING DIMENSIONS, GO AND NOT GO SETTING PLUG GAGES FOR ADJUSTABLE RING AND INDICATING GAGES FOR EXTERNAL THREAD, CENTRALIZING SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C (CONT'D)

	Go External Setting Plug							Not Go External Setting Plug						
	Major Diameter				Pitch Diameter		Minor Diameter, Clear (Reference)	Major Diameter				Pitch Diameter		Minor Diameter, Clear (Reference)
	Full Form		Truncated					Full Form		Truncated				
Designation	Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.	Max.	Min.	Max.	Min.	
1.5000-4.0 ACME-2C	1.5020	1.5000	1.4583	1.4563	1.3652	1.3641	1.2632	1.5020	1.5000	1.4583	1.4563	1.3440	1.3429	1.3125
1.5000-4.0 ACME-3C	1.5020	1.5000	1.4583	1.4563	1.3677	1.3669	1.2657	1.5020	1.5000	1.4583	1.4563	1.3581	1.3573	1.3125
1.5000-4.0 ACME-4C	1.5020	1.5000	1.4583	1.4563	1.3701	1.3693	1.2691	1.5020	1.5000	1.4583	1.4563	1.3635	1.3627	1.3125
1.7500-4.0 ACME-2C	1.7520	1.7500	1.7083	1.7063	1.6145	1.6134	1.5125	1.7520	1.7500	1.7083	1.7063	1.5927	1.5916	1.5625
1.7500-4.0 ACME-3C	1.7520	1.7500	1.7083	1.7063	1.6171	1.6163	1.5151	1.7520	1.7500	1.7083	1.7063	1.6072	1.6064	1.5625
1.7500-4.0 ACME-4C	1.7520	1.7500	1.7083	1.7063	1.6198	1.6190	1.5178	1.7520	1.7500	1.7083	1.7063	1.6130	1.6122	1.5625
2.0000-4.0 ACME-2C	2.0020	2.0000	1.9583	1.9563	1.8637	1.8626	1.7617	2.0020	2.0000	1.9583	1.9563	1.8413	1.8402	1.8125
2.0000-4.0 ACME-3C	2.0020	2.0000	1.9583	1.9563	1.8665	1.8657	1.7645	2.0020	2.0000	1.9583	1.9563	1.8563	1.8555	1.8125
2.0000-4.0 ACME-4C	2.0020	2.0000	1.9583	1.9563	1.8693	1.8685	1.7673	2.0020	2.0000	1.9583	1.9563	1.8623	1.8615	1.8125
2.2500-3.0 ACME-2C	2.2520	2.2500	2.1944	2.1924	2.0713	2.0700	1.9360	2.2520	2.2500	2.1944	2.1924	2.0463	2.0450	2.0000
2.2500-3.0 ACME-3C	2.2520	2.2500	2.1944	2.1924	2.0743	2.0735	1.9390	2.2520	2.2500	2.1944	2.1924	2.0628	2.0620	2.0000
2.2500-3.0 ACME-4C	2.2520	2.2500	2.1944	2.1924	2.0773	2.0765	1.9420	2.2520	2.2500	2.1944	2.1924	2.0693	2.0685	2.0000
2.5000-3.0 ACME-2C	2.5020	2.5000	2.4444	2.4424	2.3207	2.3194	1.1854	2.5020	2.5000	2.4444	2.4424	2.2952	2.2939	2.2500
2.5000-3.0 ACME-3C	2.5020	2.5000	2.4444	2.4424	2.3238	2.3230	1.1885	2.5020	2.5000	2.4444	2.4424	2.3121	2.3113	2.2500
2.5000-3.0 ACME-4C	2.5020	2.5000	2.4444	2.4424	2.3270	2.3262	1.1917	2.5020	2.5000	2.4444	2.4424	2.3189	2.3181	2.2500
2.7500-3.0 ACME-2C	2.7520	2.7500	2.6944	2.6924	2.5700	2.5687	2.4347	2.7520	2.7500	2.6944	2.6924	2.5440	2.5427	2.5000
2.7500-3.0 ACME-3C	2.7520	2.7500	2.6944	2.6924	2.5734	2.5726	2.4381	2.7520	2.7500	2.6944	2.6924	2.5615	2.5607	2.5000
2.7500-3.0 ACME-4C	2.7520	2.7500	2.6944	2.6924	2.5767	2.5759	2.4414	2.7520	2.7500	2.6944	2.6924	2.5684	2.5676	2.5000
3.0000-2.0 ACME-2C	3.0020	3.0000	2.9167	2.9147	2.7360	2.7345	2.5340	3.0020	3.0000	2.9167	2.9147	2.7059	2.7044	2.6250
3.0000-2.0 ACME-3C	3.0020	3.0000	2.9167	2.9147	2.7395	2.7385	2.5375	3.0020	3.0000	2.9167	2.9147	2.7258	2.7248	2.6250
3.0000-2.0 ACME-4C	3.0020	3.0000	2.9167	2.9147	2.7430	2.7420	2.5410	3.0020	3.0000	2.9167	2.9147	2.7335	2.7325	2.6250
3.5000-2.0 ACME-2C	3.5020	3.5000	3.4167	3.4147	3.2350	3.2335	3.0330	3.5020	3.5000	3.4167	3.4147	3.2041	3.2026	3.1250
3.5000-2.0 ACME-3C	3.5020	3.5000	3.4167	3.4147	3.2388	3.2378	3.0368	3.5020	3.5000	3.4167	3.4147	3.2247	3.2237	3.1250
3.5000-2.0 ACME-4C	3.5020	3.5000	3.4167	3.4147	3.2425	3.2415	3.0405	3.5020	3.5000	3.4167	3.4147	3.2327	3.2317	3.1250

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TABLE 25 LIMITING DIMENSIONS, GO AND NOT GO SETTING PLUG GAGES FOR ADJUSTABLE RING AND INDICATING GAGES FOR EXTERNAL THREAD, CENTRALIZING SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C (CONT'D)

	Go External Setting Plug							Not Go External Setting Plug						
	Major Diameter				Pitch Diameter		Minor Diameter, Clear (Reference)	Major Diameter				Pitch Diameter		Minor Diameter, Clear (Reference)
	Full Form		Truncated					Full Form		Truncated				
	Max.	Min.	Max.	Min.	Max.	Min.		Max.	Min.	Max.	Min.	Max.	Min.	
4.0000-2.0 ACME-2C	4.0020	4.0000	3.9167	3.9147	3.7340	3.7325	3.5320	4.0020	4.0000	3.9167	3.9147	3.7023	3.7008	3.6250
4.0000-2.0 ACME-3C	4.0020	4.0000	3.9167	3.9147	3.7380	3.7370	3.5360	4.0020	4.0000	3.9167	3.9147	3.7235	3.7225	3.6250
4.0000-2.0 ACME-4C	4.0020	4.0000	3.9167	3.9147	3.7420	3.7410	3.5400	4.0020	4.0000	3.9167	3.9147	3.7319	3.7309	3.6250
4.5000-2.0 ACME-2C	4.5020	4.5000	4.4167	4.4147	4.2330	4.2315	4.0310	4.5020	4.5000	4.4167	4.4147	4.2006	4.1991	4.1250
4.5000-2.0 ACME-3C	4.5020	4.5000	4.4167	4.4147	4.2373	4.2363	4.0352	4.5020	4.5000	4.4167	4.4147	4.2225	4.2215	4.1250
4.5000-2.0 ACME-4C	4.5020	4.5000	4.4167	4.4147	4.2415	4.2405	4.0395	4.5020	4.5000	4.4167	4.4147	4.2312	4.2302	4.1250
5.0000-2.0 ACME-2C	5.0020	5.0000	4.9167	4.9147	4.7319	4.7304	4.5299	5.0020	5.0000	4.9167	4.9147	4.6988	4.6973	4.6250
5.0000-2.0 ACME-3C	5.0020	5.0000	4.9167	4.9147	4.7364	4.7354	4.5344	5.0020	5.0000	4.9167	4.9147	4.7212	4.7202	4.6250
5.0000-2.0 ACME-4C	5.0020	5.0000	4.9167	4.9147	4.7409	4.7399	4.5389	5.0020	5.0000	4.9167	4.9147	4.7304	4.7294	4.6250

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TABLE 26 LIMITING DIMENSIONS, GO AND NOT GO WORKING ADJUSTABLE RING GAGES FOR EXTERNAL THREAD, CENTRALIZING SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C

	Go External Working Ring					Not Go External Working Ring				
	Major Diameter, Clear	Pitch Diameter		Minor Diameter		Major Diameter, Clear	Pitch Diameter		Minor Diameter	
Designation	(Reference)	Max.	Min.	Max.	Min.	(Reference)	Max.	Min.	Max.	Min.
0.5000-10.0 ACME-2C	0.5100	0.4443	0.4436	0.4043	0.4023	0.5100	0.4313	0.4306	0.4270	0.4250
0.5000-10.0 ACME-3C	0.5100	0.4458	0.4452	0.4058	0.4038	0.5100	0.4400	0.4394	0.4270	0.4250
0.5000-10.0 ACME-4C	0.5100	0.4472	0.4466	0.4072	0.4052	0.5100	0.4432	0.4426	0.4270	0.4250
0.6250-8.0 ACME-2C	0.6350	0.5562	0.5554	0.5062	0.5042	0.6350	0.5416	0.5408	0.5332	0.5312
0.6250-8.0 ACME-3C	0.6350	0.5578	0.5571	0.5078	0.5058	0.6350	0.5513	0.5506	0.5332	0.5312
0.6250-8.0 ACME-4C	0.6350	0.5593	0.5586	0.5093	0.5073	0.6350	0.5549	0.5542	0.5332	0.5312
0.7500-6.0 ACME-2C	0.7600	0.6598	0.6589	0.5931	0.5911	0.7600	0.6433	0.6424	0.6270	0.6250
0.7500-6.0 ACME-3C	0.7600	0.6615	0.6608	0.5948	0.5928	0.7600	0.6541	0.6534	0.6270	0.6250
0.7500-6.0 ACME-4C	0.7600	0.6632	0.6625	0.5965	0.5945	0.7600	0.6581	0.6574	0.6270	0.6250
0.8750-6.0 ACME-2C	0.8850	0.7842	0.7833	0.7175	0.7155	0.8850	0.7672	0.7663	0.7520	0.7500
0.8750-6.0 ACME-3C	0.8850	0.7861	0.7854	0.7194	0.7174	0.8850	0.7785	0.7778	0.7520	0.7500
0.8750-6.0 ACME-4C	0.8850	0.7880	0.7873	0.7213	0.7193	0.8850	0.7827	0.7820	0.7520	0.7500
1.0000-5.0 ACME-2C	1.0100	0.8920	0.8910	0.8120	0.8100	1.0100	0.8736	0.8726	0.8520	0.8500
1.0000-5.0 ACME-3C	1.0100	0.8940	0.8932	0.8140	0.8120	1.0100	0.8857	0.8849	0.8520	0.8500
1.0000-5.0 ACME-4C	1.0100	0.8960	0.8952	0.8160	0.8140	1.0100	0.8903	0.8895	0.8520	0.8500
1.1250-5.0 ACME-2C	1.1350	1.0165	1.0155	0.9365	0.9345	1.1350	0.9777	0.9967	0.9770	0.9750
1.1250-5.0 ACME-3C	1.1350	1.0186	1.0178	0.9386	0.9366	1.1350	1.0102	1.0094	0.9770	0.9750
1.1250-5.0 ACME-4C	1.1350	1.0208	1.0200	0.9408	0.9388	1.1350	1.0150	1.0142	0.9770	0.9750
1.2500-5.0 ACME-2C	1.2600	1.1411	1.1401	1.0611	1.0591	1.2600	1.1220	1.1210	1.1020	1.1000
1.2500-5.0 ACME-3C	1.2600	1.1433	1.1425	1.0633	1.0613	1.2600	1.1347	1.1339	1.1020	1.1000
1.2500-5.0 ACME-4C	1.2600	1.1455	1.1447	1.0655	1.0635	1.2600	1.1396	1.1388	1.1020	1.1000
1.3750-4.0 ACME-2C	1.3850	1.2406	1.2395	1.1406	1.1386	1.3850	1.2197	1.2186	1.1895	1.1875
1.3750-4.0 ACME-3C	1.3850	1.2430	1.2422	1.1430	1.1410	1.3850	1.2335	1.2327	1.1895	1.1875
1.3750-4.0 ACME-4C	1.3850	1.2453	1.2445	1.1453	1.1433	1.3850	1.2388	1.2380	1.1895	1.1875
1.5000-4.0 ACME-2C	1.5100	1.3652	1.3641	1.2652	1.2632	1.5100	1.3440	1.3429	1.3145	1.3125
1.5000-4.0 ACME-3C	1.5100	1.3677	1.3669	1.2677	1.2657	1.5100	1.3581	1.3573	1.3145	1.3125
1.5000-4.0 ACME-4C	1.5100	1.3701	1.3693	1.2701	1.2681	1.5100	1.3635	1.3627	1.3145	1.3125
1.7500-4.0 ACME-2C	1.7600	1.6145	1.6134	1.5145	1.5125	1.7600	1.5927	1.5916	1.5645	1.5625
1.7500-4.0 ACME-3C	1.7600	1.6171	1.6163	1.5171	1.5151	1.7600	1.6072	1.6064	1.5645	1.5625
1.7500-4.0 ACME-4C	1.7600	1.6198	1.6190	1.5198	1.5178	1.7600	1.6130	1.6122	1.5645	1.5625
2.0000-4.0 ACME-2C	2.0100	1.8637	1.8626	1.7637	1.7617	2.0100	1.8413	1.8402	1.8145	1.8125
2.0000-4.0 ACME-3C	2.0100	1.8665	1.8657	1.7665	1.7645	2.0100	1.8563	1.8555	1.8145	1.8125
2.0000-4.0 ACME-4C	2.0100	1.8693	1.8685	1.7693	1.7673	2.0100	1.8623	1.8615	1.8145	1.8125
2.2500-3.0 ACME-2C	2.2600	2.0713	2.0700	1.9380	1.9360	2.2600	2.0463	2.0450	2.0020	2.0000
2.2500-3.0 ACME-3C	2.2600	2.0743	2.0735	1.9410	1.9390	2.2600	2.0628	2.0620	2.0020	2.0000
2.2500-3.0 ACME-4C	2.2600	2.0773	2.0765	1.9440	1.9420	2.2600	2.0693	2.0685	2.0020	2.0000

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TABLE 26 LIMITING DIMENSIONS, GO AND NOT GO WORKING ADJUSTABLE RING GAGES FOR EXTERNAL THREAD, CENTRALIZING SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C (CONT'D)

	Go External Working Ring					Not Go External Working Ring				
	Major Diameter, Clear	Pitch Diameter		Minor Diameter		Major Diameter, Clear	Pitch Diameter		Minor Diameter	
Designation	(Reference)	Max.	Min.	Max.	Min.	(Reference)	Max.	Min.	Max.	Min.
2.5000-3.0 ACME-2C	2.5100	2.3207	2.3194	2.1874	2.1854	2.5100	2.2952	2.2939	2.2520	2.2500
2.5000-3.0 ACME-3C	2.5100	2.3238	2.3230	2.1905	2.1885	2.5100	2.3121	2.3113	2.2520	2.2500
2.5000-3.0 ACME-4C	2.5100	2.3270	2.3262	2.1937	2.1917	2.5100	2.3189	2.3181	2.2520	2.2500
2.7500-3.0 ACME-2C	2.7600	2.5700	2.5687	2.4367	2.4347	2.7600	2.5440	2.5427	2.5020	2.5000
2.7500-3.0 ACME-3C	2.7600	2.5734	2.5726	2.4401	2.4381	2.7600	2.5615	2.5607	2.5020	2.5000
2.7500-3.0 ACME-4C	2.7600	2.5767	2.5759	2.4434	2.4414	2.7600	2.5684	2.5676	2.5020	2.5000
3.0000-2.0 ACME-2C	3.0100	2.7360	2.7345	2.5360	2.5340	3.0100	2.7059	2.7044	2.6270	2.6250
3.0000-2.0 ACME-3C	3.0100	2.7395	2.7385	2.5395	2.5375	3.0100	2.7258	2.7248	2.6270	2.6250
3.0000-2.0 ACME-4C	3.0100	2.7430	2.7420	2.5430	2.5410	3.0100	2.7335	2.7325	2.6270	2.6250
3.5000-2.0 ACME-2C	3.5100	3.2350	3.2335	3.0350	3.0330	3.5100	3.2041	3.2026	3.1270	3.1250
3.5000-2.0 ACME-3C	3.5100	3.2388	3.2378	3.0388	3.0368	3.5100	3.2247	3.2237	3.1270	3.1250
3.5000-2.0 ACME-4C	3.5100	3.2425	3.2415	3.0425	3.0405	3.5100	3.2327	3.2317	3.1270	3.1250
4.0000-2.0 ACME-2C	4.0100	3.7340	3.7325	3.5340	3.5320	4.0100	3.7023	3.7008	3.6270	3.6250
4.0000-2.0 ACME-3C	4.0100	3.7380	3.7370	3.5380	3.5360	4.0100	3.7235	3.7225	3.6270	3.6250
4.0000-2.0 ACME-4C	4.0100	3.7420	3.7410	3.5420	3.5400	4.0100	3.7319	3.7309	3.6270	3.6250
4.5000-2.0 ACME-2C	4.5100	4.2330	4.2315	4.0330	4.0310	4.5100	4.2006	4.1991	4.1270	4.1250
4.5000-2.0 ACME-3C	4.5100	4.2373	4.2363	4.0373	4.0353	4.5100	4.2225	4.2215	4.1270	4.1250
4.5000-2.0 ACME-4C	4.5100	4.2415	4.2405	4.0315	4.0295	4.5100	4.2312	4.2302	4.1270	4.1250
5.0000-2.0 ACME-2C	5.0100	4.7319	4.7304	4.5319	4.5299	5.0100	4.6988	4.6973	4.6270	4.6250
5.0000-2.0 ACME-3C	5.0100	4.7364	4.7354	4.5364	4.5344	5.0100	4.7212	4.7202	4.6270	4.6250
5.0000-2.0 ACME-4C	5.0100	4.7409	4.7399	4.5409	4.5389	5.0100	4.7304	4.7294	4.6270	4.6250

GENERAL NOTE: Working ring gage has same pitch diameter tolerance as its set plug.

(d) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18).

(e) Thread Form. Thread form is shown in Fig. 9.

5.2.3 Not Go Thread Ring Gages

(a) Major Diameter. The major diameter of the Not Go ring gage or indicating gage contacts shall clear the maximum major diameter of the external part by 0.010 in. minimum for new gages. For recalibration of used gages, the ring should have sufficient clearance at the major diameter to clear the full form of the setting gage. The determination of this clearance is best facilitated by the use of a truncated setting plug rather than a full-form setting plug gage.

NOTE: Threads/in. finer than 16 may not be practical or possible to achieve 0.010 in. minimum clearance. The clearance in the ring at the major diameter is acceptable if the ring can be properly set on a truncated setting plug and the ring clears the full-form major diameter on the setting plug.

(b) Pitch Diameter. The size of a Not Go thread ring gage shall be determined by its fit on the minimum-material limit thread setting plug gage.

(c) Minor Diameter. The minor diameter shall be basic minor diameter of the internal thread plus $P/4$, with the tolerance plus. If this results in a minor diameter larger than the gage pitch diameter size, the gage pitch diameter size shall be used for the minor diameter size with the tolerance minus.

(d) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18).

(e) Thread Form. Thread form is shown in Fig. 10.

5.2.3.1 Minimum-Material Pitch Diameter Indicating Thread Gage. This gage is described in para. 4.5.4 and illustrated in Figs. 11 and 12.

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5.2.4 Minimum-Material Limit Thread Setting Plug Gage for Not Go Thread Ring Gage

(a) Major Diameter. The major diameter of the full-form portion of the Not Go thread setting plug shall be the same as the maximum major diameter of the external thread. The gage tolerance shall be plus. The truncated portion of the Not Go thread setting plug gage shall be one-third of the basic thread depth ($P/6$) smaller than the maximum major diameter of the external thread. The gage tolerance (see Table 24) shall be minus.

(b) Pitch Diameter. The pitch diameter shall be the same as the minimum pitch diameter of the external thread, with the tolerance taken plus.

(c) Minor Diameter. The minor diameter shall be cleared below the minimum minor diameter of the Not Go thread ring gage.

(d) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18).

(e) Thread Form. Thread form for full-form and truncated Not Go thread setting plug gage is shown in Fig. 13.

5.2.5 Go Plain Ring and Snap Gage for Major Diameter. See para. 4.5.6.

5.2.6 Not Go Plain Ring or Snap Gage for Major Diameter. See para. 4.5.7.

5.2.7 Indicating Gage for Minor Diameter. See para. 4.5.8.

5.2.8 Indicating Gage for Circular Runout. See para. 4.5.9.

5.2.9 Differential Gaging. See para. 4.5.10.

5.2.10 Identification. The gage should be marked by the nominal size, threads/in., ACME, Class, Acme type C, GO or NOT GO, and pitch diameter. The calibrated pitch diameter values may be on an attached tag.

EXAMPLE: 1 1/4-5 ACME-4C NOT GO PD 1.1210

5.3 Gages for Internal Centralizing Acme Screw Threads

Limits of size for Go and Not Go working plug gages for internal centralizing Acme threads (see Table 27), indicating gage solid setting ring (see Table 22), and Not Go thread plug gages for major diameter of centralizing internal threads (see Table 28) are given at the end of section 5.

5.3.1 Go Functional Working Thread Plug Gage or Indicating Gage With Segments, Rolls, or Balls

(a) Major Diameter. The major diameter of the Go thread plug gage shall be the same as the minimum major diameter of the internal thread with plus tolerance. Both corners of the crest shall be chamfered equally at an angle of 45 deg, leaving a width of flat at crest of $0.28P$, $+0.00$, $-0.02P$.

(b) Pitch Diameter. The pitch diameter shall be equal to the minimum (basic) pitch diameter of the internal thread, with tolerance taken plus.

(c) Minor Diameter. The minor diameter shall clear a diameter smaller by 0.010 in., minimum, than minimum minor diameter of the internal thread.

NOTE: The minor diameter of the working plug gage is a clearance only. A minimum of 0.010 in. is suggested. More clearance is acceptable, but note that on threads finer than 16 TPI, even a 0.010 in. clearance may not be possible. In such cases, the gage manufacturer will have to determine an amount to clear the minimum minor diameter of the internal thread.

(d) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18). See para. 4.7 for LE greater than the plug gage length.

(e) Thread Form. The Go plug gage thread form is shown in Fig. 19 and for indicating gage contacts in Fig. 20.

5.3.2 Not Go Working Thread Plug Gage

(a) Major Diameter. The major diameter of the Not Go thread plug gage shall be equal to the maximum (basic) major diameter of the external thread minus $P/4$, with tolerance taken minus (see Table 24). If this results in a major diameter smaller than the gage pitch diameter size, the gage pitch diameter size shall be used as the major diameter, with the gage tolerance taken plus.

(b) Pitch Diameter. The pitch diameter shall be equal to the maximum pitch diameter of the internal thread, with the tolerance taken minus.

(c) Minor Diameter. The minor diameter shall clear a diameter smaller by 0.010 in., minimum, than minimum minor diameter of the internal thread.

NOTE: The minor diameter of the working plug gage is a clearance only. A minimum of 0.010 in. is suggested. More clearance is acceptable, but note that on threads finer than 16 TPI, even a 0.010 in. clearance may not be possible. In such cases, the gage manufacturer will have to determine an amount to clear the minimum minor diameter of the internal thread. Clearance cut is optional unless specified in the procurement contract.

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TABLE 27 LIMITING DIMENSIONS, GO AND NOT GO WORKING PLUG GAGES FOR INTERNAL THREAD, CENTRALIZING SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C

	Go Internal Working Plug					Not Go Internal Working Plug				
	Minor Diameter, Clear	Pitch Diameter		Major Diameter		Minor Diameter, Clear	Pitch Diameter		Major Diameter	
Designation	(Reference)	Min.	Max.	Min.	Max.	(Reference)	Min.	Max.	Min.	Max.
0.5000-10.0 ACME-2C	0.4000	0.4500	0.4507	0.5007	0.5009	0.4000	0.4630	0.4637	0.4730	0.4750
0.5000-10.0 ACME-3C	0.4000	0.4500	0.4506	0.5007	0.5009	0.4000	0.4558	0.4564	0.4730	0.4750
0.5000-10.0 ACME-4C	0.4000	0.4500	0.4506	0.5007	0.5009	0.4000	0.4540	0.4546	0.4730	0.4750
0.6250-8.0 ACME-2C	0.5025	0.5625	0.5633	0.6258	0.6260	0.5025	0.5771	0.5779	0.5918	0.5938
0.6250-8.0 ACME-3C	0.5025	0.5625	0.5632	0.6258	0.6260	0.5025	0.5690	0.5697	0.5918	0.5938
0.6250-8.0 ACME-4C	0.5025	0.5625	0.5632	0.6258	0.6260	0.5025	0.5669	0.5676	0.5918	0.5938
0.7500-6.0 ACME-2C	0.5900	0.6667	0.6676	0.7509	0.7511	0.5900	0.6832	0.6841	0.7063	0.7083
0.7500-6.0 ACME-3C	0.5900	0.6667	0.6674	0.7509	0.7511	0.5900	0.6741	0.6748	0.7063	0.7083
0.7500-6.0 ACME-4C	0.5900	0.6667	0.6674	0.7509	0.7511	0.5900	0.6718	0.6725	0.7063	0.7083
0.8750-6.0 ACME-2C	0.7150	0.7917	0.7926	0.8759	0.8761	0.7150	0.8087	0.8096	0.8313	0.8333
0.8750-6.0 ACME-3C	0.7150	0.7917	0.7924	0.8759	0.8761	0.7150	0.7993	0.8000	0.8313	0.8333
0.8750-6.0 ACME-4C	0.7150	0.7917	0.7924	0.8759	0.8761	0.7150	0.7970	0.7977	0.8313	0.8333
1.0000-5.0 ACME-2C	0.8100	0.9000	0.9010	1.0010	1.0012	0.8100	0.9184	0.9194	0.9480	0.9500
1.0000-5.0 ACME-3C	0.8100	0.9000	0.9008	1.0010	1.0012	0.8100	0.9083	0.9091	0.9480	0.9500
1.0000-5.0 ACME-4C	0.8100	0.9000	0.9008	1.0010	1.0012	0.8100	0.9057	0.9065	0.9480	0.9500
1.1250-5.0 ACME-2C	0.9350	1.0250	1.0260	1.1261	1.1263	0.9350	1.0438	1.0448	1.0730	1.0750
1.1250-5.0 ACME-3C	0.9350	1.0250	1.0258	1.1261	1.1263	0.9350	1.0334	1.0342	1.0730	1.0750
1.1250-5.0 ACME-4C	0.9350	1.0250	1.0258	1.1261	1.1263	0.9350	1.0308	1.0316	1.0730	1.0750
1.2500-5.0 ACME-2C	1.0600	1.1500	1.1510	1.2511	1.2513	1.0600	1.1691	1.1701	1.1980	1.2000
1.2500-5.0 ACME-3C	1.0600	1.1500	1.1508	1.2511	1.2513	1.0600	1.1586	1.1594	1.1980	1.2000
1.2500-5.0 ACME-4C	1.0600	1.1500	1.1508	1.2511	1.2513	1.0600	1.1559	1.1567	1.1980	1.2000
1.3750-4.0 ACME-2C	1.1400	1.2500	1.2511	1.3762	1.37645	1.1400	1.2709	1.2720	1.3105	1.3125
1.3750-4.0 ACME-3C	1.1400	1.2500	1.2508	1.3762	1.37645	1.1400	1.2595	1.2603	1.3105	1.3125
1.3750-4.0 ACME-4C	1.1400	1.2500	1.2508	1.3762	1.37645	1.1400	1.2565	1.2573	1.3105	1.3125
1.5000-4.0 ACME-2C	1.2650	1.3750	1.3761	1.5012	1.50145	1.2650	1.3962	1.3973	1.4355	1.4375
1.5000-4.0 ACME-3C	1.2650	1.3750	1.3758	1.5012	1.50145	1.2650	1.3846	1.3854	1.4355	1.4375
1.5000-4.0 ACME-4C	1.2650	1.3750	1.3758	1.5012	1.50145	1.2650	1.3816	1.3824	1.4355	1.4375
1.7500-4.0 ACME-2C	1.5150	1.6250	1.6261	1.7513	1.75155	1.5150	1.6468	1.6479	1.6855	1.6875
1.7500-4.0 ACME-3C	1.5150	1.6250	1.6258	1.7513	1.75155	1.5150	1.6349	1.6357	1.6855	1.6875
1.7500-4.0 ACME-4C	1.5150	1.6250	1.6258	1.7513	1.75155	1.5150	1.6318	1.6326	1.6855	1.6875
2.0000-4.0 ACME-2C	1.7650	1.8750	1.8761	2.0014	2.00165	1.7650	1.8974	1.8985	1.9355	1.9375
2.0000-4.0 ACME-3C	1.7650	1.8750	1.8758	2.0014	2.00165	1.7650	1.8852	1.8860	1.9355	1.9375
2.0000-4.0 ACME-4C	1.7650	1.8750	1.8758	2.0014	2.00165	1.7650	1.8820	1.8828	1.9355	1.9375
2.2500-3.0 ACME-2C	1.9400	2.0833	2.0846	2.2515	2.2518	1.9400	2.1083	2.1096	2.1647	2.1667
2.2500-3.0 ACME-3C	1.9400	2.0833	2.0841	2.2515	2.2518	1.9400	2.0948	2.0956	2.1647	2.1667
2.2500-3.0 ACME-4C	1.9400	2.0833	2.0841	2.2515	2.2518	1.9400	2.0913	2.0921	2.1647	2.1667

(continued)

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TABLE 27 LIMITING DIMENSIONS, GO AND NOT GO WORKING PLUG GAGES FOR INTERNAL THREAD, CENTRALIZING SINGLE-START ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C (CONT'D)

	Go Internal Working Plug					Not Go Internal Working Plug				
	Minor Diameter, Clear	Pitch Diameter		Major Diameter		Minor Diameter, Clear	Pitch Diameter		Major Diameter	
Designation	(Reference)	Min.	Max.	Min.	Max.	(Reference)	Min.	Max.	Min.	Max.
2.5000-3.0 ACME-2C	2.1900	2.3333	2.3346	2.5016	2.5019	2.1900	2.3588	2.3601	2.4147	2.4167
2.5000-3.0 ACME-3C	2.1900	2.3333	2.3341	2.5016	2.5019	2.1900	2.3450	2.3458	2.4147	2.4167
2.5000-3.0 ACME-4C	2.1900	2.3333	2.3341	2.5016	2.5019	2.1900	2.3414	2.3422	2.4147	2.4167
2.7500-3.0 ACME-2C	2.4400	2.5833	2.5846	2.7517	2.7520	2.4400	2.6093	2.6106	2.6647	2.6667
2.7500-3.0 ACME-3C	2.4400	2.5833	2.5841	2.7517	2.7520	2.4400	2.5952	2.5960	2.6647	2.6667
2.7500-3.0 ACME-4C	2.4400	2.5833	2.5841	2.7517	2.7520	2.4400	2.5916	2.5924	2.6647	2.6667
3.0000-2.0 ACME-2C	2.5400	2.7500	2.7515	3.0017	3.0020	2.5400	2.7637	2.7816	2.8730	2.8750
3.0000-2.0 ACME-3C	2.5400	2.7500	2.7510	3.0017	3.0020	2.5400	2.7639	2.7647	2.8730	2.8750
3.0000-2.0 ACME-4C	2.5400	2.7500	2.7510	3.0017	3.0020	2.5400	2.7595	2.7605	2.8730	2.8750
3.5000-2.0 ACME-2C	3.0400	3.2500	3.2515	3.5019	3.5022	3.0400	3.2809	3.2824	3.3730	3.3750
3.5000-2.0 ACME-3C	3.0400	3.2500	3.2510	3.5019	3.5022	3.0400	3.2641	3.2651	3.3730	3.3750
3.5000-2.0 ACME-4C	3.0400	3.2500	3.2510	3.5019	3.5022	3.0400	3.2598	3.2608	3.3730	3.3750
4.0000-2.0 ACME-2C	3.5400	3.7500	3.7515	4.0020	4.0023	3.5400	3.7819	3.7832	3.8730	3.8750
4.0000-2.0 ACME-3C	3.5400	3.7500	3.7510	4.0020	4.0023	3.5400	3.7645	3.7655	3.8730	3.8750
4.0000-2.0 ACME-4C	3.5400	3.7500	3.7510	4.0020	4.0023	3.5400	3.7601	3.7611	3.8730	3.8750
4.5000-2.0 ACME-2C	4.0400	4.2500	4.2515	4.5021	4.5024	4.0400	4.2824	4.2839	4.3730	4.3750
4.5000-2.0 ACME-3C	4.0400	4.2500	4.2510	4.5021	4.5024	4.0400	4.2648	4.2658	4.3730	4.3750
4.5000-2.0 ACME-4C	4.0400	4.2500	4.2510	4.5021	4.5024	4.0400	4.2603	4.2613	4.3730	4.3750
5.0000-2.0 ACME-2C	4.5400	4.7500	4.7515	5.0022	5.0025	4.5400	4.7831	4.7846	4.8730	4.8750
5.0000-2.0 ACME-3C	4.5400	4.7500	4.7510	5.0022	5.0025	4.5400	4.7652	4.7662	4.8730	4.8750
5.0000-2.0 ACME-4C	4.5400	4.7500	4.7510	5.0022	5.0025	4.5400	4.7605	4.7615	4.8730	4.8750

(d) Length. Use gage blanks in accordance with ASME B47.1 (see Table 18).

(e) Thread Form. The Not Go thread form is shown in Fig. 21.

5.3.3 Minimum-Material Pitch Diameter Indicating Gage. See para. 4.6.3.

5.3.4 Solid Go Thread Setting Ring Gage for Indicating Gage. See para. 4.6.4 and Appendix G2.

5.3.5 Go Plain Plug Gage for Minor Diameter of Internal Threads. The diameter of the Go plain plug gage, shown in Fig. 25, shall be the same as the minimum minor diameter of the internal thread. The gage tolerance shall be taken plus (see Table 23). The gage length shall be in accordance with ASME B47.1 (see Table 18).

5.3.6 Not Go Plain Plug Gage for Minor Diameter of Internal Thread. The diameter of the Not Go plain plug gage shall be the same as the maximum minor diameter of the internal thread. The gage tolerance shall be taken minus (see Table 23). The gage length shall be in accordance with ASME B47.1 (see Table 18).

5.3.7 Not Go Thread Plug Gage for Major Diameter of Centralizing Internal Threads. Limiting dimensions are given in Table 28. The major diameter shall be equal to the maximum major diameter of the internal thread. The tolerance shall be in accordance with Table 24 and applied minus. The included angle shall be 29 deg. The pitch diameter shall be the maximum pitch diameter of the Class 4C centralizing external thread (for centralizing internal threads, Classes 2C, 3C, and 4C), with a minus tolerance of twice that

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TABLE 28 LIMITING DIMENSIONS, NOT GO THREAD PLUG GAGES FOR MAJOR DIAMETER OF CENTRALIZING SINGLE-START INTERNAL ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C

	Major Diameter		Pitch Diameter		Minor Diameter, Clear	Length of Engage-	Crest Flat,
Designation	Max.	Min.	Max.	Min.	(Reference)	ment	0.24*P* Max.
0.5000-10.0 ACME-2C	0.5032	0.5030	0.4472	0.4460	0.4000	0.300	0.024
0.5000-10.0 ACME-3C	0.5032	0.5030	0.4472	0.4460	0.4000	0.300	0.024
0.5000-10.0 ACME-4C	0.5021	0.5019	0.4472	0.4460	0.4000	0.300	0.024
0.6250-8.0 ACME-2C	0.6286	0.6284	0.5593	0.5579	0.5025	0.375	0.030
0.6250-8.0 ACME-3C	0.6286	0.6284	0.5593	0.5579	0.5025	0.375	0.030
0.6250-8.0 ACME-4C	0.6274	0.6272	0.5593	0.5579	0.5025	0.375	0.030
0.7500-6.0 ACME-2C	0.7539	0.7537	0.6632	0.6618	0.5900	0.500	0.040
0.7500-6.0 ACME-3C	0.7539	0.7537	0.6632	0.6618	0.5900	0.500	0.040
0.7500-6.0 ACME-4C	0.7526	0.7524	0.6632	0.6618	0.5900	0.500	0.040
0.8750-6.0 ACME-2C	0.8792	0.8790	0.7880	0.7866	0.7150	0.500	0.040
0.8750-6.0 ACME-3C	0.8792	0.8790	0.7880	0.7866	0.7150	0.500	0.040
0.8750-6.0 ACME-4C	0.8778	0.8776	0.7880	0.7866	0.7150	0.500	0.040
1.0000-5.0 ACME-2C	1.0045	1.0043	0.8960	0.8944	0.8100	0.600	0.048
1.0000-5.0 ACME-3C	1.0045	1.0043	0.8960	0.8944	0.8100	0.600	0.048
1.0000-5.0 ACME-4C	1.0030	1.0028	0.8960	0.8944	0.8100	0.600	0.048
1.1250-5.0 ACME-2C	1.1298	1.1296	1.0208	1.0192	0.9350	0.600	0.048
1.1250-5.0 ACME-3C	1.1298	1.1296	1.0208	1.0192	0.9350	0.600	0.048
1.1250-5.0 ACME-4C	1.1282	1.1280	1.0208	1.0192	0.9350	0.600	0.048
1.2500-5.0 ACME-2C	1.2550	1.2548	1.1455	1.1439	1.0600	0.600	0.048
1.2500-5.0 ACME-3C	1.2550	1.2548	1.1455	1.1439	1.0600	0.600	0.048
1.2500-5.0 ACME-4C	1.2533	1.2531	1.1455	1.1439	1.0600	0.600	0.048
1.3750-4.0 ACME-2C	1.3803	1.38005	1.2453	1.2437	1.1400	0.750	0.060
1.3750-4.0 ACME-3C	1.3803	1.38005	1.2453	1.2437	1.1400	0.750	0.060
1.3750-4.0 ACME-4C	1.3785	1.37825	1.2453	1.2437	1.1400	0.750	0.060
1.5000-4.0 ACME-2C	1.5055	1.50525	1.3701	1.3685	1.2650	0.750	0.060
1.5000-4.0 ACME-3C	1.5055	1.50525	1.3701	1.3685	1.2650	0.750	0.060
1.5000-4.0 ACME-4C	1.5036	1.50335	1.3701	1.3685	1.2650	0.750	0.060
1.7500-4.0 ACME-2C	1.7559	1.75565	1.6198	1.6182	1.5150	0.750	0.060
1.7500-4.0 ACME-3C	1.7559	1.75565	1.6198	1.6182	1.5150	0.750	0.060
1.7500-4.0 ACME-4C	1.7539	1.75365	1.6198	1.6182	1.5150	0.750	0.060
2.0000-4.0 ACME-2C	2.0063	2.00605	1.8693	1.8677	1.7650	0.750	0.060
2.0000-4.0 ACME-3C	2.0063	2.00605	1.8693	1.8677	1.7650	0.750	0.060
2.0000-4.0 ACME-4C	2.0042	2.00395	1.8693	1.8677	1.7650	0.750	0.060
2.2500-3.0 ACME-2C	2.2568	2.2565	2.0773	2.0757	1.9400	1.000	0.080
2.2500-3.0 ACME-3C	2.2568	2.2565	2.0773	2.0757	1.9400	1.000	0.080
2.2500-3.0 ACME-4C	2.2545	2.2542	2.0773	2.0757	1.9400	1.000	0.080
2.5000-3.0 ACME-2C	2.5071	2.5068	2.3270	2.3254	2.1900	1.000	0.080
2.5000-3.0 ACME-3C	2.5071	2.5068	2.3270	2.3254	2.1900	1.000	0.080
2.5000-3.0 ACME-4C	2.5048	2.5045	2.3270	2.3254	2.1900	1.000	0.080

(continued)

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TABLE 28 LIMITING DIMENSIONS, NOT GO THREAD PLUG GAGES FOR MAJOR DIAMETER OF CENTRALIZING SINGLE-START INTERNAL ACME SCREW THREADS, STANDARD SERIES, CLASSES 2C, 3C, AND 4C (CONT'D)

Designation	Major Diameter		Pitch Diameter		Minor Diameter, Clear (Reference)	Length of Engagement	Crest Flat, 0.24*P* Max.
	Max.	Min.	Max.	Min.			
2.7500-3.0 ACME-2C	2.7575	2.7572	2.5767	2.5751	2.4400	1.000	0.080
2.7500-3.0 ACME-3C	2.7575	2.7572	2.5767	2.5751	2.4400	1.000	0.080
2.7500-3.0 ACME-4C	2.7550	2.7547	2.5767	2.5751	2.4400	1.000	0.080
3.0000-2.0 ACME-2C	3.0078	3.0074	2.7430	2.7410	2.5400	1.500	0.120
3.0000-2.0 ACME-3C	3.0078	3.0074	2.7430	2.7410	2.5400	1.500	0.120
3.0000-2.0 ACME-4C	3.0052	3.0048	2.7430	2.7410	2.5400	1.500	0.120
3.5000-2.0 ACME-2C	3.5084	3.5080	3.2425	3.2405	3.0400	1.500	0.120
3.5000-2.0 ACME-3C	3.5084	3.5080	3.2425	3.2405	3.0400	1.500	0.120
3.5000-2.0 ACME-4C	3.5056	3.5052	3.2425	3.2405	3.0400	1.500	0.120
4.0000-2.0 ACME-2C	4.0090	4.0086	3.7420	3.7400	3.5400	1.500	0.120
4.0000-2.0 ACME-3C	4.0090	4.0086	3.7420	3.7400	3.5400	1.500	0.120
4.0000-2.0 ACME-4C	4.0060	4.0056	3.7420	3.7400	3.5400	1.500	0.120
4.5000-2.0 ACME-2C	4.5095	4.5091	4.2415	4.2395	4.0400	1.500	0.120
4.5000-2.0 ACME-3C	4.5095	4.5091	4.2415	4.2395	4.0400	1.500	0.120
4.5000-2.0 ACME-4C	4.5063	4.5059	4.2415	4.2395	4.0400	1.500	0.120
5.0000-2.0 ACME-2C	5.0100	5.0096	4.7409	4.7389	4.5400	1.500	0.120
5.0000-2.0 ACME-3C	5.0100	5.0096	4.7409	4.7389	4.5400	1.500	0.120
5.0000-2.0 ACME-4C	5.0067	5.0063	4.7409	4.7389	4.5400	1.500	0.120

given in Table 24. The crest corners shall be chamfered 45 deg equally to leave a central crest flat not more than 0.24*P* wide. The approximate depth of chamfer is 0.07*P*. The minor diameter shall clear a diameter less by 0.01 in. than the minimum minor diameter of the internal thread. The length should approximate 3*P*. When a multiple-start thread is involved, the Not Go gage shall be of such length as to provide at least one full turn of thread. See also Fig. 31.

5.3.8 Minor Diameter Indicating Gage. See para. 4.6.9.

5.3.9 Major Diameter Indicating Gage. See para. 4.6.10.

5.3.10 Circular Runout Indicating Gage. See para. 4.6.7.

5.3.11 Differential Gaging. See para. 4.6.8.

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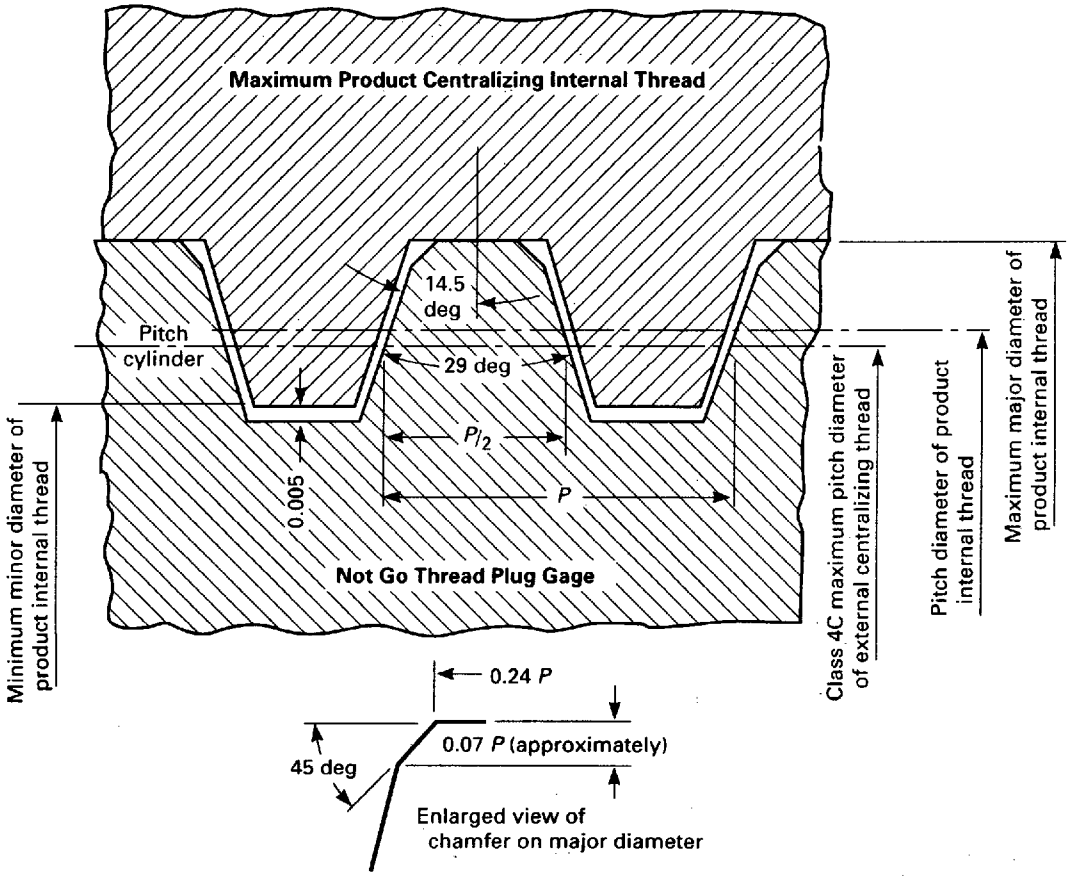


FIG. 31 NOT GO THREAD PLUG GAGE FOR MAJOR DIAMETER OF CENTRALIZING INTERNAL THREAD

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NONMANDATORY APPENDIX A
ACME CENTRALIZING THREADS ALTERNATE SERIES WITH MINOR DIAMETER CENTRALIZING CONTROL

A1 GENERAL

When Acme centralizing threads are produced in small quantities (principally in sizes larger than the range of available taps and dies), it may be desirable to have centralizing control of mating parts located at the minor diameters because it may be easier to measure the minor diameter (root) of the external thread and the mating minor diameter (crest or bore) of the internal thread.

A2 ALTERNATE CENTRALIZING ACME PROFILE

The alternate profile is the inverted profile of Fig. 5. The major diameter of Fig. 5 is now the minor diameter for minor diameter centralizing Acme control. Use the matching details of chamfer and fillet.

A3 TABLE REFERENCES

The references to Table numbers in the formulas for product limits of size provide the allowances and tolerances to be used; but some table heading labels must be ignored because revised tables are not provided.

A4 FORMULAS TO DETERMINE PRODUCT LIMITS OF SIZE FOR ALTERNATE THREADS

A4.1 Single-Start Alternate Centralizing Acme Threads

(a) External Threads

(1) Major diameter:

(Basic) maximum major diameter = nominal size or diameter D

$$d\ max. = d\ bsc = D\ bsc$$

Minimum major diameter = external maximum major diameter − Td (Table 4)

$$d\ min. = d\ bsc - Td$$

(2) Pitch diameter:

Maximum pitch diameter = internal minimum pitch diameter − allowance (Table 9)

$$d_2\ max. = D_2\ min. - (es)$$

Minimum pitch diameter = external maximum pitch diameter − Td_2 (Table 5, 6, or 7)

$$d_2\ min. = d_2\ max. - Td_2$$

(3) Minor diameter:

Maximum minor diameter = external maximum major diameter − pitch − allowance (Table 15, allowance for internal thread major diameter)

$$d_1\ max. = d\ bsc - P - (es)$$

Minimum minor diameter = external maximum minor diameter − Td_1 (Table 15, tolerance for external thread major diameter)

$$d_1\ min. = d_1\ max. - Td_1$$

(b) Internal Thread

(1) Major diameter:

Minimum major diameter = external maximum major diameter + allowance (Table 4)

$$D\ min. = D\ bsc + (EI)$$

Maximum major diameter = internal minimum major diameter + TD (Table 4)

$$D\ max. = D\ min. + TD$$

(2) Pitch diameter:

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(Basic) minimum pitch diameter = external maximum major diameter − $P/2$

$$D_2\ min. = d\ bsc - P/2$$

Maximum pitch diameter = internal minimum pitch diameter + TD_2 (Table 5, 6, or 7)

$$D_2\ max. = D_2\ min. + TD_2$$

(3) Minor diameter:

(Basic) minimum minor diameter = external maximum major diameter − P

$$D_1\ min. = d\ max. - P$$

Maximum minor diameter = internal minimum minor diameter + TD_1 (Table 14, tolerance for internal thread major diameter)

$$D_1\ max. = D_1\ min. + TD_1$$

A5 GAGES

A5.1 Gage Tolerances

See para. 5.1.

A5.1.1 For tolerance on pitch diameter, see para. 5.1.1.

A5.1.2 For tolerance on major and minor diameters, see para. 5.1.2.

A5.1.3 For tolerance on lead, see para. 5.1.3.

A5.1.4 For tolerance on axial flank angle, see para. 5.1.4.

A5.1.5 For functional size, see para. 4.1.5.

A5.2 Gaging

Use section 5 on gaging centralizing Acme threads as a guide.

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NONMANDATORY APPENDIX B
MULTIPLE-START ACME THREADS

B1 GENERAL

As stated in the body of ASME B1.5, the tabulated diameter/pitch data with allowances and tolerances relates to the usage of single-start threads only.

The data as tabulated may be and often is used with two-start Class 2G threads, but this usage requires reduction of the full working tolerance to provide a greater allowance of clearance zone between the mating threads to ensure satisfactory assembly.

When the class of thread requires smaller working tolerances than Class 2G or when threads with three, four, or more starts are required, some additional allowance should be provided to ensure satisfactory assembly of mating threaded parts.

The pitch diameter allowances for single-start threads (as in Table 9) should be used for all external threads.

The allowances should be applied to the minimum-material of the internal thread in the following ratios: for two-start threads, 50% of the allowance shown in Table 9; for three-start threads, 75% of allowance; and for four-start, 100% of the same values. These values will provide, on a 0.2500 in.-16-ACME-2G thread size, 0.002, 0.003, and 0.004 additional clearance for two-, three-, and four-start threads. Go thread working plug gage is not changed. The pitch diameter of the Not Go thread plug gage would increase by these values.

For multiple-start threads with more than four starts, it is believed that the 100% allowance provided by the above procedure would be adequate as indexing spacing variables would generally be no greater than on a four-start thread.

The above additional percentages may be reduced at the option of the purchaser where there is exceptionally good control over lead, angle, and spacing variables.

Designations for gages or tool for internal threads should cover allowance requirements as follows: Not Go thread gages for 2.875-0.4P-0.8L-ACME-2G with 50% of the 4G external thread allowance.

B1.1

Even though this Appendix is not part of the Standard, it is recommended that both part manufacturers and buyers reference Appendix B on their purchase orders to gage manufacturers. Doing so will permit interchangeability of independently manufactured assemblies.

B2 FORMULAS FOR DETERMINING DIAMETERS ON MULTIPLE-START GENERAL PURPOSE AND CENTRALIZING ACME THREADS

B2.1 External Thread

Major, minor, and pitch diameter sizes for each class are identical to those for single-start threads.

B2.2 Internal Threads

The major, minor, and pitch diameter sizes are increased by a percentage of allowance (*es*) given in Table 9.

(a) For two-start threads, add 50% of (*es*).

(b) For three-start threads, add 75% of (*es*).

(c) For four-start threads, add 100% of (*es*).

(d) For five-start threads and greater, add 100% of (*es*).

(1) Major diameter:

Minimum major diameter = external maximum major diameter + allowance (Table 4)

$$D\ min. = D\ bsc + (EI)$$

Maximum major diameter = internal minimum major diameter + *TD* (Table 4) + _% allowance (Table 9)

$$D\ max. = D\ min. + TD \text{ (Table 4)} + _\% \text{ allowance (Table 9)}$$

(2) Pitch diameter:

Minimum pitch diameter = external maximum major diameter – *P*/2

$$D_2\ min. = d\ bsc - P/2$$

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Maximum pitch diameter = internal minimum pitch diameter + TD_2 (Table 5, 6, or 7) + _% allowance (Table 9)

$$D_2\ max. = D_2\ min. + TD_2 \text{ (Table 5, 6, or 7)} + _\% \text{ allowance (Table 9)}$$

(3) Minor diameter:

Minimum minor diameter = external maximum major diameter − P

$$D_1\ min. = d\ max. - P$$

Maximum minor diameter = internal minimum minor diameter + TD_1 (Table 4) + _% allowance (Table 9)

$$D_1\ max. = D_1\ min. + TD_1 \text{ (Table 4)} + _\% \text{ allowance (Table 9)}$$

B2.3

For high-precision, multiple-start assemblies, the single-start class 4G or 4C tolerances may be acceptable.

B3 PRODUCT TOLERANCES

B3.1 Lead

See para. 2.12.5.

B3.2 Flank Angle

See Table 8.

B4 GAGE TOLERANCE FOR GENERAL PURPOSE THREADS

B4.1 Major and Minor Diameters

See para. 4.4.2 and Tables 17, 23, H1, and H3. For allowance for minimum-material internal thread gage, see Table 9.

B4.2 Pitch Diameter

See para. 4.4.1 and Tables 17 and H1. For allowance for minimum-material internal thread gage, see Table 9.

B4.3 Lead in Same Groove

See para. 4.4.3.

B4.4 Lead (Index) in All Grooves

The pitch and lead tolerances shall be multiplied by 1.5. See para 4.4.3.

B5 GAGE TOLERANCES FOR CENTRALIZING THREADS

B5.1 Major and Minor Diameters

See para. 5.1.2 and Tables 23, 24, H2, and H3. For allowance for minimum-material internal thread gage, see Table 9.

B5.2 Pitch Diameter

See para. 5.1.1 and Tables 24 and H2. For allowance for minimum-material internal thread gage, see Table 9.

B5.3 Lead in Same Groove

See para. 5.1.3.

B5.4 Lead (Index) in All Grooves

The pitch and lead tolerances shall be multiplied by 1.5. See para 5.1.3.

B6 CALCULATING THE FLANK ANGLE FROM OPTICAL MEASURED FLANK ANGLE NORMAL TO THE LEAD ANGLE

See Appendix G2.

B7 LENGTH OF GAGE BLANK

Go gage should have more than one complete turn of thread engagement. The Not Go gage shall have a minimum of one complete turn of thread engagement.

B8 GAGE CONVOLUTION

Multiple-start gages may be chamfered or convoluted at the discretion of the gage manufacturer or by mutual agreement with the purchaser.

B9 CALCULATING THE PITCH DIAMETER, ALTERNATE METHOD

For most applications, use procedure in Appendix E for pitch diameter determination.

The procedure and formulas in Appendix E assume that screw threads are made to nominal pitch, lead, and

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flank angles. This simplification may produce greater uncertainty in pitch diameter.

The following procedure uses the same Vogel's β_{800} formula, but the measured values for pitch, lead, and average flank angle replace the nominal values to obtain a more reliable pitch diameter.

The intent of Vogel's equation for external screws was to set up prior requirements (exact wire size, measurement over wires, and chosen pitch diameter size) so that the screw could be manufactured to the chosen pitch diameter. When an unknown pitch diameter near the chosen pitch diameter size is to be measured with available wires, modifications to the procedure are outlined for multiple-start threads.

(a) Calculating the β or key angle:

$$\cot \beta_{800} = 1 / \hat{\gamma} + \hat{\gamma} (\sin^2 \phi_n - \sin^2 \lambda / 3) + \tan \phi_n \cos^2 \lambda + Z$$

where

L = lead
N = 1 for single-start thread
d_{2c} = chosen pitch diameter
s = number of starts
α_n = $\tan^{-1}(\tan \alpha_x \cos \lambda)$, degrees = flank angle viewed normal to the lead angle
α_x = average axial flank angle, degrees
β = degrees
$\hat{\gamma}$ = $(\sin^2 \lambda)\pi / 2N$, radians
λ = $L / \pi d_{2c}$ lead angle, degrees
$\hat{\sigma}$ = $\pi / 2N_s$, radians
ϕ_m = main pressure angle
ϕ_n = normal pressure angle
$\tan \phi_n$ = $\tan \alpha_x / \tan \lambda$, degrees

Starts	If ϕ_n = 0 deg through 21 deg	If ϕ_n is > than 21 deg
1 through 4	$Z = 0$	$Z = \lvert(\phi_n - 20 \text{ deg}) / 10 \text{ deg}\rvert (1.01\phi_n^2 - \sin^2\phi_n)$
Over 4	$Z = 0$	$Z = 0$ if γ greater than 27 deg; otherwise, $Z = \lvert(\phi_n^2 - 20 \text{ deg}) / 10 \text{ deg}\rvert (1.01\phi_n^2 - \sin^2\phi_n)$

(b) Establishing the center distance for exact wire in thread groove:

$$2F = d_{2c} \tan^2 \lambda (\hat{\sigma} - \hat{\beta}) / \sin \beta$$

where

F = radial distance between center of screw and center of exact wire in thread groove

(c) Determine diameter of exact size wire:

$$W_e = 2F (\sin \beta / \sin \lambda \cos \alpha_n)$$

where

W_e = diameter of exact size wire

(d) Value for measurement over exact wires:

$$M_{we} = 2F + W_e$$

where

M_{we} = measurement over exact wires

(e) Calculating a correction difference due to the increase or decrease in measurement over exact wires and available wires:

$$\Delta M = (W_e - W_a) (1 + \text{cosec } \alpha_n)$$

where

ΔM = ± correction for wire difference
W_a = available wire size

(f) Apply the correction in (e) above to measurement over wires in (d) above to get a corrected measurement over available wires for the chosen pitch diameter.

$$M_{wa} = M_{we} \pm \Delta M$$

where

M_{wa} = theoretical measurement over available wires for chosen pitch diameter

(g) Difference between theoretical measurement over available wires in (f) above and actual measurement over available wires:

$$C = M_{wa} - M_w$$

(h) Determine a more reliable pitch diameter for the screw gage:

$$d_2 = d_{2c} \pm C$$

B9.1

Calculated examples for 1.125-0.2P-0.8L-ACME external thread:

Vogel best-size wire = 0.100196 in.
Measurement over wires = 1.14985 in.
α_x = 14.5 deg; TPI = 5; lead = 0.800 in.
Gives true pitch diameter = 1.02500 in.

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Available wire = 0.11000 in.
Measurement over wires = 1.19997 in.
α_x = 14.5 deg; TPI = 5; lead = 0.800 in.
Gives true pitch diameter = 1.02504 in.

Vogel's best-size wire = 0.100284 in.
Measurement over wires = 1.15029 in.
α_x = 14.7 deg; TPI = 5; lead = 0.800 in.
Gives true pitch diameter = 1.02500 in.

Available wire = 0.11000 in.
Measurement over wires = 1.19938 in.
α_x = 14.7 deg; TPI = 5; lead = 0.800 in.
Gives true pitch diameter = 1.02500 in.

B10 THREAD WIRE POSITIONS FOR PITCH DIAMETER MEASUREMENTS

All thread-measuring wires shall be positioned in the same lead groove (not the pitch groove). Otherwise, variations in indexing of starts produce false pitch diameter measurements. Each lead groove must be measured.

When face of measuring instrument anvil is too small, increase it by wringing a gage block to it or improvise other means.

B11 DESIGNATION

See para. 2.15.1 for general purpose threads and para. 3.15.1 for centralizing threads.

B12 IDENTIFICATION

The gage identification should be nominal size, pitch, lead, ACME, class, Acme type, GO or NOT GO, and pitch diameter on gage. Calibrated pitch diameter may be on an attached tag.

EXAMPLE: 1.125-0.2P-0.8L-ACME-3C GO PD 1.025

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NONMANDATORY APPENDIX C
GENERAL PURPOSE ACME THREAD CLASS 5G[1]

C1 GENERAL

Class 5G threads were provided where minimal backlash or end play was required. Assemblies of internal and external Class 5G threads could require some fitting to obtain satisfactory results.

Class 5G is not recommended for new designs. It has been used for assemblies with short lengths of engagement.

C2 ALLOWANCES

Class 5G has no pitch diameter allowance on either external or internal threads. Major and minor diameter allowances are the same as for Classes 2G, 3G, and 4G.

C3 TOLERANCES

Pitch diameter tolerance for Class 5G is equal to 0.8 times that of Class 4G or $0.008\sqrt{P} + 0.0016\sqrt{D}$. These are tabulated in Table C1. Tolerances on major and minor diameters are the same as for Classes 2G, 3G, and 4G.

C4 LIMIT DIMENSIONS

Table C2 lists limiting dimensions and tolerances for a selection of Class 5G threads.

[1] Not recommended for new designs.

TABLE C1 PITCH DIAMETER TOLERANCES FOR GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, CLASS 5G

Threads/in. n	Pitch Increment, $0.008\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]							
		1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8
16	0.002000	0.002800	0.002894	0.002980	0.003058	0.003131	0.003265	0.003386	...
14	0.002138	...	0.003032	0.003118	0.003196	0.003269	0.003403	0.003524	0.003635
12	0.002309	...	...	0.003289	0.003367	0.003440	0.003574	0.003695	0.003806
10	0.002530	...	...	0.003510	0.003588	0.003661	0.003795	0.003816	0.004027
8	0.002828	...	...	...	...	0.003959	0.004093	0.004214	0.004325
6	0.003266	...	...	...	...	...	...	0.004652	0.004763
5	0.003578	...	...	...	...	...	...	...	0.005075
4	0.004000	...	...	...	...	...	...	...	...
3	0.004619	...	...	...	...	...	...	...	...
2 1/2	0.005060	...	...	...	...	...	...	...	...
2	0.005657	...	...	...	...	...	...	...	...
1 1/2	0.006532	...	...	...	...	...	...	...	...
1 1/3	0.006928	...	...	...	...	...	...	...	...
1	0.008000	...	...	...	...	...	...	...	...
Diameter Increment, $0.0016\sqrt{D}$ [Note (1)] →		0.000800	0.000894	0.000980	0.001058	0.001131	0.001265	0.001387	0.001497

(continued)

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TABLE C1 PITCH DIAMETER TOLERANCES FOR GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, CLASS 5G (CONT'D)

Threads/in. n	Pitch Increment, $0.008\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]							
		1	1⅛	1¼	1⅜	1½	1¾	2	2¼
16	0.002000	...	...	...	...	...	...	...	...
14	0.002138	0.003738	...	...	...	...	...	...	...
12	0.002309	0.003909	0.004006	0.004098	...	...	...	...	...
10	0.002530	0.004130	0.004227	0.004319	0.004406	0.004490	0.004647	...	...
8	0.002828	0.004428	0.004525	0.004617	0.004704	0.004788	0.004945	0.005091	...
6	0.003266	0.004866	0.004963	0.005055	0.005142	0.005226	0.005383	0.005529	0.005666
5	0.003578	0.005178	0.005275	0.005367	0.005454	0.005538	0.005695	0.005841	0.005978
4	0.004000	...	0.005697	0.005789	0.005876	0.005960	0.006117	0.006263	0.006400
3	0.004619	...	...	...	...	0.006579	0.006736	0.006882	0.007019
2½	0.005060	...	...	...	...	0.007020	0.007177	0.007323	0.007460
2	0.005657	...	...	...	...	0.007617	0.007774	0.007920	0.008057
1½	0.006532	...	...	...	...	...	...	...	...
1⅓	0.006928	...	...	...	...	...	...	...	...
1	0.008000	...	...	...	...	...	...	...	...
Diameter Increment, $0.0016\sqrt{D}$ [Note (1)] →		0.001600	0.001697	0.001789	0.001876	0.001960	0.002117	0.002263	0.002400

Threads/in. n	Pitch Increment, $0.008\sqrt{1/n}$ [Note (1)]	Nominal Diameter [Note (2)]						
		2½	2¾	3	3½	4	4½	5
16	0.002000	...	...	...	...	...	...	...
14	0.002138	...	...	...	...	...	...	...
12	0.002309	...	...	...	...	...	...	...
10	0.002530	...	...	...	...	...	...	...
8	0.002828	...	...	...	...	...	...	...
6	0.003266	...	...	...	...	...	...	...
5	0.003578	0.006108	...	...	...	...	...	...
4	0.004000	0.006530	0.006653	0.006771	0.006993	0.007200	...	...
3	0.004619	0.007149	0.007272	0.007390	0.007612	0.007819	0.008013	0.008197
2½	0.005060	0.007590	0.007713	0.007831	0.008053	0.008260	0.008454	0.008638
2	0.005657	0.008187	0.008310	0.008428	0.008650	0.008857	0.009051	0.009235
1½	0.006532	0.009062	0.009185	0.009303	0.009525	0.009732	0.009926	0.010110
1⅓	0.006928	...	0.009581	0.009698	0.009921	0.010128	0.010322	0.010508
1	0.008000	...	...	0.010771	0.010993	0.011200	0.011394	0.011578
Diameter Increment, $0.0016\sqrt{D}$ [Note (1)] →		0.002530	0.002653	0.002771	0.002993	0.003200	0.003394	0.003578

GENERAL NOTE: The equivalent tolerance on thread thickness is 0.259 times the pitch diameter tolerance.

NOTES:

(1) The pitch diameter tolerances shown in this Table equal the sum of the pitch increment and the diameter increment.

(2) For an intermediate nominal diameter, apply the pitch diameter tolerance for the next larger nominal diameter given in this Table. (See also para. 1.7.)

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TABLE C2 LIMITING DIMENSIONS AND TOLERANCES FOR GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, CLASS 5G

Limiting Dimensions and Tolerances		Nominal Diameter, *D*											
		1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8
		Threads/in.											
		16	14	12	12	10	8	6	6	5	5	5	4
External Threads													
Class 5G, major diameter	max. (*D*)	0.2500	0.3125	0.3750	0.4375	0.5000	0.6250	0.7500	0.8750	1.0000	1.1250	1.2500	1.3750
	min.	0.2450	0.3075	0.3700	0.4325	0.4950	0.6188	0.7417	0.8667	0.9900	1.1150	1.2400	1.3625
	tol.	0.0050	0.0050	0.0050	0.0050	0.0050	0.0062	0.0083	0.0083	0.0100	0.0100	0.0100	0.0125
Class 5G, minor diameter	max.	0.1775	0.2311	0.2817	0.3442	0.3800	0.4800	0.5633	0.6883	0.7800	0.9050	1.0300	1.1050
	min.	0.1733	0.2266	0.2768	0.3392	0.3745	0.4739	0.5563	0.6812	0.7722	0.8971	1.0220	1.0962
Class 5G, pitch diameter	max.	0.2188	0.2768	0.3333	0.3958	0.4500	0.5625	0.6667	0.7917	0.9000	1.0250	1.1500	1.2500
	min.	0.2160	0.2738	0.3300	0.3924	0.4463	0.5584	0.6620	0.7869	0.8948	1.0197	1.1446	1.2441
	tol.	0.0028	0.0030	0.0033	0.0034	0.0037	0.0041	0.0047	0.0048	0.0052	0.0053	0.0054	0.0059
Internal Threads													
Class 5G, major diameter	min.	0.2600	0.3225	0.3850	0.4475	0.5200	0.6450	0.7700	0.8950	1.0200	1.1450	1.2700	1.3950
	max.	0.2700	0.3325	0.3950	0.4575	0.5400	0.6650	0.7900	0.9150	1.0400	1.1650	1.2900	1.4150
Class 5G, minor diameter	min.	0.1875	0.2411	0.2917	0.3542	0.4000	0.5000	0.5833	0.7083	0.8000	0.9250	1.0500	1.1250
	max.	0.1925	0.2461	0.2967	0.3592	0.4050	0.5062	0.5916	0.7166	0.8100	0.9350	1.0600	1.1375
	tol.	0.0050	0.0050	0.0050	0.0050	0.0050	0.0062	0.0083	0.0083	0.0100	0.0100	0.0100	0.0125
Class 5G, pitch diameter	min.	0.2188	0.2768	0.3333	0.3958	0.4500	0.5625	0.6667	0.7917	0.9000	1.0250	1.1500	1.2500
	max.	0.2216	0.2798	0.3366	0.3992	0.4537	0.5666	0.6714	0.7965	0.9052	1.0303	1.1554	1.2559
	tol.	0.0028	0.0030	0.0033	0.0034	0.0037	0.0041	0.0047	0.0048	0.0052	0.0053	0.0054	0.0059

(continued)

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TABLE C2 LIMITING DIMENSIONS AND TOLERANCES FOR GENERAL PURPOSE SINGLE-START ACME SCREW THREADS, CLASS 5G (CONT'D)

Limiting Dimensions and Tolerances		Nominal Diameter, *D*										
		1½	1¾	2	2¼	2½	2¾	3	3½	4	4½	5
		Threads/in.										
		4	4	4	3	3	3	2	2	2	2	2
External Threads												
Class 5G, major diameter	max. (*D*)	1.5000	1.7500	2.0000	2.2500	2.5000	2.7500	3.0000	3.5000	4.0000	4.5000	5.0000
	min.	1.4875	1.7375	1.9875	2.2333	2.4833	2.7333	2.9750	3.4750	3.9750	4.4750	4.9750
	tol.	0.0125	0.0125	0.0125	0.0167	0.0167	0.0167	0.0250	0.0250	0.0250	0.0250	0.0250
Class 5G, minor diameter	max.	1.2300	1.4800	1.7300	1.8967	2.1467	2.3967	2.4800	2.9800	3.4800	3.9800	4.4800
	min.	1.2210	1.4708	1.7206	1.8862	2.1360	2.3858	2.4674	2.9670	3.4667	3.9664	4.4661
Class 5G, pitch diameter	max.	1.3750	1.6250	1.8750	2.0833	2.3333	2.5833	2.7500	3.2500	3.7500	4.2500	4.7500
	min.	1.3690	1.6189	1.8687	2.0763	2.3262	2.5760	2.7416	3.2414	3.7411	4.2409	4.7408
	tol.	0.0060	0.0061	0.0063	0.0070	0.0071	0.0073	0.0084	0.0086	0.0089	0.0091	0.0092
Internal Threads												
Class 5G, major diameter	min.	1.5200	1.7700	2.0200	2.2700	2.5200	2.7700	3.0200	3.5200	4.0200	4.5200	5.0200
	max.	1.5400	1.7900	2.0400	2.2900	2.5400	2.7900	3.0400	3.5400	4.0400	4.5400	5.0400
Class 5G, minor diameter	min.	1.2500	1.5000	1.7500	1.9167	2.1667	2.4167	2.5000	3.0000	3.5000	4.0000	4.5000
	max.	1.2625	1.5125	1.7625	1.9334	2.1834	2.4334	2.5250	3.0250	3.5250	4.0250	4.5250
	tol.	0.0125	0.0125	0.0125	0.0167	0.0167	0.0167	0.0250	0.0250	0.0250	0.0250	0.0250
Class 5G, pitch diameter	min.	1.3750	1.6250	1.8750	2.0833	2.3333	2.5833	2.7500	3.2500	3.7500	4.2500	4.7500
	max.	1.3810	1.6311	1.8813	2.0903	2.3404	2.5906	2.7584	3.2587	3.7589	4.2591	4.7592
	tol.	0.0060	0.0061	0.0063	0.0070	0.0071	0.0073	0.0084	0.0087	0.0089	0.0091	0.0092

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NONMANDATORY APPENDIX D
CENTRALIZING ACME THREAD CLASSES 5C AND 6C[1]

D1 DESIGN PROFILE

Design profile for Classes 5C and 6C is the same as for Classes 2C, 3C, and 4C, except that the maximum major diameter for the external thread is less than the nominal size D by $0.025\sqrt{D}$. These Classes had been added to the 1945 edition of B1.5 at the request of several aircraft companies.

D2 ALLOWANCES

Pitch diameter allowances for Classes 5C and 6C are the same as for Classes 2C and 3C, respectively. Major and minor diameter allowances are the same as for Classes 2C, 3C, and 4C.

D3 TOLERANCES

Classes 5C and 6C tolerances for pitch, major, and minor diameters are the same as for Classes 3C and 4C, respectively. External thread root fillet radii are controlled between a minimum of $0.07P$ and the standard maximum of $0.10P$.

D4 LIMIT DIMENSIONS

Table D1 lists limiting dimensions and tolerances for a selection of Class 5C and 6C threads.

[1] These Classes are not recommended for new designs.

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TABLE D1 LIMITING DIMENSIONS AND TOLERANCES FOR CENTRALIZING SINGLE-START ACME SCREW THREADS, CLASSES 5C AND 6C

		Nominal Diameter, *D*								
		1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
		Threads/in.								
Limiting Dimensions and Tolerances		**10**	**8**	**6**	**6**	**5**	**5**	**5**	**4**	**4**
External Threads										
Classes 5C and 6C, major diameter	max.	0.4823	0.6052	0.7283	0.8516	0.9750	1.0985	1.2220	1.3457	1.4694
Class 5C, major diameter	min.	0.4812	0.6040	0.7270	0.8502	0.9735	1.0969	1.2203	1.3439	1.4676
	tol.	0.0011	0.0012	0.0013	0.0014	0.0015	0.0016	0.0017	0.0018	0.0018
Class 6C, major diameter	min.	0.4816	0.6044	0.7274	0.8507	0.9740	1.0974	1.2209	1.3445	1.4682
	tol.	0.0007	0.0008	0.0009	0.0009	0.0010	0.0011	0.0011	0.0012	0.0012
Classes 5C and 6C, minor diameter	max.	0.3623	0.4602	0.5416	0.6649	0.7550	0.8785	1.0020	1.0757	1.1994
Class 5C, minor diameter	min.	0.3527	0.4495	0.5294	0.6524	0.7414	0.8647	0.9879	1.0603	1.1838
Class 6C, minor diameter	min.	0.3554	0.4525	0.5329	0.6560	0.7453	0.8686	0.9919	1.0647	1.1882
Class 5C, pitch diameter	max.	0.4266	0.5364	0.6381	0.7008	0.8670	0.9900	1.1131	1.2113	1.3346
	min.	0.4202	0.5292	0.6300	0.7525	0.8579	0.9808	1.1037	1.2010	1.3242
	tol.	0.0064	0.0072	0.0081	0.0083	0.0091	0.0092	0.0094	0.0103	0.0104
Class 6C, pitch diameter	max.	0.4281	0.5380	0.6398	0.7627	0.8690	0.9921	1.1153	1.2137	1.3371
	min.	0.4235	0.5329	0.6340	0.7567	0.8625	0.9855	1.1086	1.2064	1.3297
	tol.	0.0046	0.0051	0.0058	0.0060	0.0065	0.0066	0.0067	0.0073	0.0074
Fillet radii at minor diameter	min.	0.0070	0.0088	0.0117	0.0117	0.0140	0.0140	0.0140	0.0175	0.0175
	max.	0.0100	0.0125	0.0167	0.0167	0.0200	0.0200	0.0200	0.0250	0.0250
Internal Threads										
Classes 5C and 6C, major diameter	min.	0.4830	0.6060	0.7292	0.8525	0.9760	1.0995	1.2231	1.3469	1.4706
Class 5C, major diameter	max.	0.4855	0.6088	0.7322	0.8558	0.9795	1.1032	1.2270	1.3510	1.4749
	tol.	0.0025	0.0028	0.0030	0.0033	0.0035	0.0037	0.0039	0.0041	0.0043
Class 6C, major diameter	max.	0.4844	0.6076	0.7309	0.8544	0.9780	1.1016	1.2253	1.3492	1.4730
	tol.	0.0014	0.0016	0.0017	0.0019	0.0020	0.0021	0.0022	0.0023	0.0024
Classes 5C and 6C, minor diameter	min.	0.3923	0.4927	0.5783	0.7016	0.7950	0.9185	1.0420	1.1207	1.2444
	max.	0.3973	0.4989	0.5866	0.7099	0.8050	0.9285	1.0520	1.1332	1.2569
	tol.	0.0050	0.0062	0.0083	0.0083	0.0100	0.0100	0.0100	0.0125	0.0125
Class 5C, pitch diameter	min.	0.4323	0.5427	0.6450	0.7683	0.8750	0.9985	1.1220	1.2207	1.3444
	max.	0.4387	0.5499	0.6531	0.7766	0.8841	1.0077	1.1314	1.2310	1.3548
	tol.	0.0064	0.0072	0.0081	0.0083	0.0091	0.0092	0.0094	0.0103	0.0104
Class 6C, pitch diameter	min.	0.4323	0.5427	0.6450	0.7683	0.8750	0.9985	1.1220	1.2207	1.3444
	max.	0.4369	0.5478	0.6508	0.7743	0.8815	1.0051	1.1287	1.2280	1.3518
	tol.	0.0046	0.0051	0.0058	0.0060	0.0065	0.0066	0.0067	0.0073	0.0074

GENERAL NOTE: The selection of threads/in. is arbitrary and is intended for the purpose of establishing a standard. All other dimensions are given in inches.

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TABLE D1 LIMITING DIMENSIONS AND TOLERANCES FOR CENTRALIZING SINGLE-START ACME SCREW THREADS, CLASSES 5C AND 6C

Nominal Diameter, *D*											
1¾	2	2¼	2½	2¾	3	3½	4	4½	5		
Threads/in.											
4	4	3	3	3	2	2	2	2	2		Limiting Dimensions and Tolerances
											External Threads
1.7169	1.9646	2.2125	2.4605	2.7085	2.9567	3.4532	3.9500	4.4470	4.9441	max.	Classes 5C and 6C, major diameter
1.7149	1.9625	2.2103	2.4581	2.7060	2.9541	3.4504	3.9470	4.4438	4.9407	min.	Class 5C, major diameter
0.0020	0.0021	0.0022	0.0024	0.0025	0.0026	0.0028	0.0030	0.0032	0.0034	tol.	
1.7156	1.9632	2.2110	2.4589	2.7068	2.9550	3.4513	3.9480	4.4449	4.9419	min.	Class 6C, major diameter
0.0013	0.0014	0.0015	0.0016	0.0017	0.0017	0.0019	0.0020	0.0021	0.0022	tol.	
1.4469	1.6946	1.8592	2.1072	2.3552	2.4367	2.9332	3.4300	3.9270	4.4241	max.	Classes 5C and 6C, minor diameter
1.4308	1.6782	1.8408	2.0884	2.3361	2.4146	2.9105	3.4068	3.9032	4.3999	min.	Class 5C, minor diameter
1.4354	1.6829	1.8460	2.0938	2.3416	2.4209	2.9170	3.4134	3.9100	4.4068	min.	Class 6C, minor diameter
1.5814	1.8283	2.0338	2.2812	2.5285	2.6927	3.1882	3.6840	4.1800	4.6760	max.	Class 5C, pitch diameter
1.5707	1.8173	2.0215	2.2687	2.5158	2.6780	3.1731	3.6685	4.1642	4.6598	min.	
0.0107	0.0110	0.0123	0.0125	0.0127	0.0147	0.0151	0.0155	0.0158	0.0162	tol.	
1.5840	1.8311	2.0368	2.2843	2.5319	2.6962	3.1920	3.6880	4.1843	4.6805	max.	Class 6C, pitch diameter
1.5764	1.8233	2.0280	2.2754	2.5228	2.6857	3.1812	3.6769	4.1730	4.6690	min.	
0.0076	0.0078	0.0088	0.0089	0.0091	0.0105	0.0108	0.0111	0.0113	0.0115	tol.	
0.0175	0.0175	0.0233	0.0233	0.0233	0.0350	0.0350	0.0350	0.0350	0.0350	min.	Fillet radii at minor diameter
0.0250	0.0250	0.0333	0.0333	0.0333	0.0500	0.0500	0.0500	0.0500	0.0500	max.	
											Internal Threads
1.7182	1.9660	2.2140	2.4621	2.7101	2.9584	3.4551	3.9520	4.4491	4.9463	min.	Classes 5C and 6C, major diameter
1.7228	1.9709	2.2192	2.4676	2.7159	2.9645	3.4616	3.9590	4.4565	4.9541	max.	Class 5C, major diameter
0.0046	0.0049	0.0052	0.0055	0.0058	0.0061	0.0065	0.0070	0.0074	0.0078	tol.	
1.7208	1.9688	2.2170	2.4653	2.7134	2.9619	3.4588	3.9560	4.4533	4.9508	max.	Class 6C, major diameter
0.0026	0.0028	0.0030	0.0032	0.0033	0.0035	0.0037	0.0040	0.0042	0.0045	tol.	
1.4919	1.7396	1.9125	2.1605	2.4085	2.5067	3.0032	3.5000	3.9970	4.4941	min.	Classes 5C and 6C, minor diameter
1.5044	1.7521	1.9292	2.1772	2.4252	2.5317	3.0282	3.5250	4.0220	4.5191	max.	
0.0125	0.0125	0.0167	0.0167	0.0167	0.0250	0.0250	0.0250	0.0250	0.0250	tol.	
1.5919	1.8396	2.0458	2.2938	2.5418	2.7067	3.2032	3.7000	4.1970	4.6941	min.	Class 5C, pitch diameter
1.6026	1.8506	2.0581	2.3063	2.5545	2.7214	3.2183	3.7155	4.2128	4.7103	max.	
0.0107	0.0110	0.0123	0.0125	0.0127	0.0147	0.0151	0.0155	0.0158	0.0162	tol.	
1.5919	1.8396	2.0458	2.2938	2.5418	2.7067	3.2032	3.7000	4.1970	4.6941	min.	Class 6C, pitch diameter
1.5995	1.8474	2.0546	2.3027	2.5509	2.7172	3.2140	3.7111	4.2083	4.7056	max.	
0.0076	0.0078	0.0088	0.0089	0.0091	0.0105	0.0108	0.0111	0.0113	0.0115	tol.	

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NONMANDATORY APPENDIX E
THREE-WIRE METHOD FOR MEASUREMENT OF PITCH DIAMETER OF 29 deg EXTERNAL ACME THREADS

E1 STANDARD SPECIFICATIONS FOR ACME THREAD WIRES AND THEIR CALIBRATION

The wires shall be accurately finished, hardened alloy tool steel of maximum hardness without being brittle. The hardness shall not be less than that corresponding to a Knoop indentation number of 630. The surface shall not be rougher than $2R_a$ microin. (0.00010 in. maximum peak to valley scratch depth).

The computed value for the pitch diameter of a screw thread gage obtained from readings over wires will depend upon the accuracy of the measuring instrument used, the contact load, and the value of the diameter of the wires used in the computations. In order to measure the pitch diameter of an Acme screw thread gage to an accuracy of 0.0001 in. by means of wires, it is necessary to know the wire diameters to 0.00002 in. Accordingly, it is necessary to use a measuring instrument that reads accurately to 0.00001 in.

E2 CALIBRATION OF BEST-SIZE ACME THREAD WIRES

Variation in diameter around the wire should be determined by rotating the wire between a measuring flat contact and an anvil having the form of a V-groove cut on a cylinder and having an included angle of 60 deg because Acme wires wedge in a 29 deg V. Thus measured, the limit on roundness variation shall be 0.00001 in.

To avoid a permanent deformation of the material of the wires and gages, it is necessary to limit the contact load, and for consistent results a standard practice as to contact load in making wire measurements of hardened screw thread gages is necessary.

In the case of Acme threads, the wire presses against the sides of the thread with a pressure of approximately twice that of the measuring instrument. This would indicate that the diameter of the wires should be measured against a hardened cylinder having a radius equal to the radius of curvature of the helical surface of the thread at the point of contact, using approximately twice the load to be used in making pitch diameter readings. It is not practical to use such a variety of sizes, and it is recommended that the measurements of wire diameter be made between a flat contact and a 0.750 in. hardened and accurately finished steel cylinder.

E3 FORCE USED FOR ACME PITCH DIAMETER MEASUREMENT

To limit the tendency of the wires to wedge in and deform the sides of an Acme thread, it is recommended that pitch diameter measurements on 8 threads/in. and finer be made at 1 lb. For coarser pitches and larger wires, the deformation of wires and threads is less than for finer pitches. Furthermore, the coarser pitches are used on larger and heavier product, on which the pitch diameter tolerance is greater and a larger measuring load may be required to make satisfactory measurements. It is, therefore, recommended that for threads/in. less than 8, the pitch diameter be measured at $2\frac{1}{2}$ lb.

Summary of Acme thread wire specifications and measuring force for pitch diameter calibration and measurement:

(a) same diameter within 0.000010 in.
(b) diameter within 0.000020 in. of best size
(c) taper over central 1 in. within 0.000010 in.
(d) out-of-round over central 1 in. within 0.000010 in.
(e) surface roughness not rougher than $2R_a$ microin. (0.000010 in., maximum, peak-to-valley scratch depth)
(f) 1 lb measuring force for 8 threads/in. and greater
(g) $2\frac{1}{2}$ lb measuring force for less than 8 threads/in.

E4 PITCH DIAMETER MEASUREMENT ON SINGLE-START EXTERNAL THREADS, BEST-SIZE WIRES, EQUATIONS, AND EXAMPLES

The combination of small flank angle and large lead angle that is characteristic of Acme threads results in a relatively large lead angle correction to be applied in wire measurements of pitch diameter of such threads.

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For single-start external threads, the general equation is:

$$d_2 = M_w + \frac{\cot \alpha}{2n} - w(1 + \operatorname{cosec} \alpha') \quad (1)$$

where

M_w = measurement over wires
d_2 = external pitch diameter
n = threads/in.
= 1/pitch
w = wire diameter
α = half angle
α' = $\tan^{-1}$ ($\tan \alpha \cos \lambda$)
λ = lead angle at pitch diameter
= $\tan^{-1}$ ($L / \pi d_2$)

When a value for measurement over wires for standard series Acme single-start threads is required, Eq. (1) is used. This equation is arranged as follows:

$$M_w = d_2 - 0.5P \cot \alpha + w(1 + \operatorname{cosec} \alpha')$$

Just substitute the required pitch diameter and best-size wire in the equation and compute the measurement over wires.

For a half angle of 14 deg 30 min, Eq. (1) takes the form

$$d_2 = M_w + \frac{1.933357}{n} - w(1 + \operatorname{cosec} \alpha') \quad (2)$$

The diameter w of the wires used should be as close as practicable to the size that will contact the flanks of the thread at the pitch line to minimize errors caused by deviations of the flank angle from nominal value. The best-size wire, for standard Acme threads, may be taken as:

$$W_d = \frac{\sec \alpha}{2n} = \frac{0.516450}{n} \quad (3)$$

for which values are tabulated in Table E1.

For standard diameter/pitch combination of Acme threads, and if the best-size wire is used, the computations are simplified by the use of Table E2. Thus

$$d_2 = M_w - \text{col. 7} \quad (4)$$

EXAMPLE: 0.250-16-ACME-4G

d_2 (Table E2, column 7) = 0.040869
w = 0.03228 in.

$$M_w = 0.2577 \text{ in.}$$
$$d_2 = 0.2577 - 0.040869 = 0.2168 \text{ in.}$$

When d_2 differs from the basic value given in column 7 of Table E2, use the following equation:

$$d_2 = M_w - \text{col. 7} - 100\,(\text{col. 3} - d_{2_1})\ \text{col. 8} \quad (5)$$

where

$$d_{2_1} = M_w - \text{col. 7}$$

EXAMPLE: 0.250-16-ACME-4G

w = 0.03228 in.
M_w = 0.2450 in.
d_{2_1} = 0.2450 − 0.040869 = 0.204131 in.
d_2 = 0.2450 − 0.040869 − 100(0.2188 − 0.204131)(0.000049) in.
d_2 = 0.204059 or 0.2041 in.

TABLE E1 WIRE SIZES, SINGLE-START ACME THREADS (29 deg)

Threads/in.	Pitch, $P = 1/n$, in.	Best-Size Wires, 0.516450 P, in. [Note (1)]
16	0.06250	0.03228
14	0.07143	0.03689
12	0.08333	0.04304
10	0.10000	0.05164
9	0.11111	0.05738
8	0.12500	0.06456
7	0.14286	0.07378
6	0.16667	0.08608
5	0.20000	0.10329
4	0.25000	0.12911
3½	0.28571	0.14756
3	0.33333	0.17215
2½	0.40000	0.20658
2	0.50000	0.25822
1½	0.66667	0.34430
1⅓	0.75000	0.38734
1	1.00000	0.51645

GENERAL NOTE: See last two paragraphs of E4 for use of other size wires.

NOTE:
(1) Based on zero lead angle.

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TABLE E2 VALUES FOR WIRE MEASUREMENTS OF SINGLE-START STANDARD ACME THREADS (29 deg)

Sizes, in.	Threads/in.	Basic Pitch Diameter, in.	Best-Size Wire $w = \frac{0.516450}{n}$, in.	$\frac{\cot 14 \text{ deg } 30 \text{ min}}{2n}$	w (1 + cosec α'), in.	Column 6 Minus Column 5, in. [Note (1)]	Change in Columns 6 and 7 per 0.01 in. Change in Pitch Diameter (Column 3), in.
1	2	3	4	5	6	7	8
0.250	16	0.2188	0.03228	0.120835	0.161704	0.040869	0.000049
0.3125	14	0.2768	0.03689	0.138097	0.184692	0.046595	0.000036
0.375	12	0.3333	0.04304	0.161113	0.215448	0.054335	0.000032
0.4375	12	0.3958	0.04304	0.161113	0.215300	0.054187	0.000019
0.500	10	0.4500	0.05164	0.193336	0.258370	0.065034	0.000021
0.625	8	0.5625	0.06456	0.241670	0.323013	0.081343	0.000021
0.750	6	0.6667	0.08608	0.322226	0.430898	0.108672	0.000030
0.875	6	0.7917	0.08608	0.322226	0.430601	0.108375	0.000022
1.000	5	0.9000	0.10329	0.386671	0.516791	0.130120	0.000019
1.125	5	1.0250	0.10329	0.386671	0.516567	0.129896	0.000014
1.250	5	1.1500	0.10329	0.386671	0.516412	0.129741	0.000011
1.375	4	1.2500	0.12911	0.483339	0.645744	0.162405	0.000014
1.500	4	1.3750	0.12911	0.483339	0.645575	0.162236	0.000014
1.750	4	1.6250	0.12911	0.483339	0.645346	0.162007	0.000006
2.000	4	1.8750	0.12911	0.483339	0.645202	0.161863	0.000005
2.250	3	2.0833	0.17215	0.644452	0.860541	0.216089	0.000007
2.500	3	2.3333	0.17215	0.644452	0.860368	0.215916	0.000005
2.750	3	2.5833	0.17215	0.644452	0.860247	0.215795	0.000003
3.000	2	2.7500	0.25822	0.966678	1.291149	0.324471	0.000010
3.500	2	3.2500	0.25822	0.966678	1.290694	0.324016	0.000008
4.000	2	3.7500	0.25822	0.966678	1.290403	0.323725	0.000004
4.500	2	4.2500	0.25822	0.966678	1.290210	0.323532	0.000004
5.000	2	4.7500	0.25822	0.966678	1.290075	0.323395	0.000003

GENERAL NOTE:
For nonstandard sizes, do not use values in the seventh column for ($C + c$) correction. A specific value for α' must be calculated.

NOTE:
(1) Given to six decimal places for purposes of computation. After subtracting from $M_{w'}$, the final result should be rounded to four places.

If the measured wire diameter w' differs slightly from the best-size wire shown in column 4,

$$d_2 = M_{w'} - \text{col. } 7 - 5\,(w' - w) - 100\,(\text{col. } 3 - d_2)\,\text{col. } 8 \qquad (6)$$

Values of the term (1 + cosec α') are given in Table E3 for use when threads of other than standard diameter/pitch combinations are to be measured. Values for intermediate lead angles may be determined by interpolation.

If the measured wire diameter (w') differs from the tabulated best-size wire diameter in Table E1, use equation (2). Use the measured wire size to make pitch diameter calculation.

EXAMPLE: 0.250-16-ACME-4G

$w' = 0.04063$ in.
$M_w = 0.2996$ in.
$\alpha' = 14.441876$ deg
(1 + cosec α') = 5.00966
$d_2 = 0.2996 + 0.120835 - 0.04063(5.00966) = 0.2168$ in.

CAUTION: Make sure that the wires do not touch the bottom of the thread groove or ride on the major diameter for Not Go setting and working plug gages and Go and Not Go truncated setting plug gages. When necessary, grind flats on measuring wires to prevent interference with thread root.

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TABLE E3 VALUES OF (1 + COSEC α′) FOR α = 14 deg 30 min AND LEAD ANGLES FROM 0 deg TO 5 deg

Lead angle λ				Lead angle λ			
deg	min	1 + cosec α′	Difference	deg	min	1 + cosec α′	Difference
0	0	4.99393	...	2	40	4.99797	25
0	5	4.99393	0	2	45	4.99823	26
0	10	4.99394	1	2	50	4.99850	27
0	15	4.99396	2	2	55	4.99877	27
0	20	4.99399	3				
0	25	4.99403	4	3	0	4.99905	28
				3	5	4.99934	29
0	30	4.99407	4	3	10	4.99964	30
0	35	4.99412	5	3	15	4.99965	31
0	40	4.99418	6	3	20	5.00026	31
0	45	4.99425	7	3	25	5.00058	32
0	50	4.99432	7				
0	55	4.99440	8	3	30	5.00091	33
				3	35	5.00125	34
1	0	4.99449	9	3	40	5.00160	35
1	5	4.99459	10	3	45	5.00195	35
1	10	4.99470	11	3	50	5.00231	36
1	15	4.99481	11	3	55	5.00268	37
1	20	4.99493	12				
1	25	4.99506	13	4	0	5.00306	38
				4	5	5.00345	39
1	30	4.99520	14	4	10	5.00384	39
1	35	4.99535	15	4	15	5.00424	40
1	40	4.99550	15	4	20	5.00465	41
1	45	4.99566	16	4	25	5.00507	42
1	50	4.99583	17				
1	55	4.99601	18	4	30	5.00550	43
				4	35	5.00593	43
2	0	4.99620	19	4	40	5.00637	44
2	5	4.99639	19	4	45	5.00682	45
2	10	4.99659	20	4	50	5.00728	46
2	15	4.99680	21	4	55	5.00775	47
2	20	4.99702	22				
2	25	4.99725	23	5	0	5.00823	48
2	30	4.99748	23	5	5	5.00871	48
2	35	4.99772	24	5	10	5.00920	49

The usable wire size may be determined with one of the following formulas: The diameter of the largest usable wire may not exceed $w' = 0.650013P$ and the smallest wire may not be less than $w' = 0.487263P$.

NOTE: When other than best-size wires are used, a correction for average flank angle deviation from 14.5 deg should be applied to the measured pitch diameter.

E5 PITCH DIAMETER MEASUREMENT ON MULTIPLE-START EXTERNAL THREADS

The following procedure assumes that the thread, to be measured, has nominal flank angles of 14.5 deg and nominal pitch and lead. See Appendix B for Vogel's same β_{800} formula using measured pitch and measured average flank angle for a more exact pitch diameter calibrated value.

E5.1 Best-Size Wires, Equations, and Examples

Multiple-start threads commonly have lead angles greater than 5 deg. In those exceptional cases that have smaller lead angles, the procedures described above may be applied. For larger lead angles, it is necessary to determine the best-size wire for the individual thread, as the size is dependent on the lead angle of the thread. This determination is simplified by extracting from Table E4 the wire diameter (interpolating if necessary)

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for a 1 in. axial pitch screw and dividing by the threads/in. Thus

$$w = w_1 / n \quad (7)$$

The pitch diameter is given by the following formula:

$$d_2 = M_w - (C + c) \quad (8)$$

Tabular values for $(C + c)$ for a 1 in. axial pitch screw, which are given in Table E4, should be divided by the threads/in., for a given case. See references (b) and (c).

Use Table E4 with wires that do not interfere with major or minor diameter of screw.

EXAMPLE: 1.1250-0.2P-0.8L-ACME-4G

d_2 *max* (Table 10) = 1.0208 in.
Computed lead angle $\lambda = \tan^{-1}(0.8 / 1.0208\pi)$
= 14.007071 deg

Find exact best-size wire and $(C + c)$ correction from Table E4 for four-start thread by interpolation for λ = 14.007071 deg.

λ, deg	W, in., for 1 thread/in.	W, in., for 5 threads/in.	(C + c) for 1 thread/in.	(C + c) for 5 threads/in.
Table value 14.0000	0.500880	. . .	0.62411	. . .
Interpolate 14.007071	0.500864	0.100173	0.624089	0.124818
Table value 14.10000	0.500660	. . .	0.623810	. . .

M_w = 1.1701 in.
w' = 0.10497 in.
w = 0.100173 in.
$\Delta w = w' - w = 0.10497 - 0.100173 = 0.004797$
$d_2 = M_w - (C + c) - \Delta(C + c)$

where $(C + c)$ is wire correction for a d_2 = 1.0208 and $\Delta(C + c)$ is an additional correction because best-size wire was not used.

$$\Delta(C + c) = \Delta w(1 + \text{cosec } \alpha') = 0.004797(5.108759) = 0.024507$$

where $\alpha' = \tan^{-1}(\tan \alpha \cos \lambda) = 14.086265$ deg

$d_2 = 1.170125 - 0.124818 - 0.02455507 = 1.0207$ in.

E6 LIMITATIONS ON THREE-WIRE MEASUREMENT OF EXTERNAL THREADS

When the lead angle and diameter of a thread are such that double contact of the measuring wires occurs, it will be necessary to check the pitch diameter by means of balls rather than wires.

For accurate measurement with wires, single contact on each flank must occur. Measuring wires can be used if the following formula is satisfied for a specific thread:

$$\tan \propto > \frac{L}{\pi}\sqrt{1 / \left(R + \frac{w}{2}\cos \alpha \cot \alpha\right)^2 - 4 / D^2}$$

where

D = major diameter of thread
R = distance from thread axis to sharp root
L = lead
w = diameter for measuring wires used
α = half-angle of thread in an axial plane

If best-size wires are used so that contact is near the pitch line, the condition for single contact simplifies to:

$$\tan \propto > \frac{2l}{\pi}\sqrt{\frac{1}{d_2^2} - \frac{1}{D^2}}$$

E7 REFERENCES

(a) Marriner, R. S. and Wood, J. G. *Rake Correction in the Measurement of Parallel External and Internal Screw Threads.* London: Institute of Mechanical Engineers, 1958.

(b) Van Keuren, H. L. *Tables for Precise Measurement of Screws.* Catalog and Handbook No. 37, 1979.

(c) Vogel, W. F. *The Exact Over-Wire Measurement of Screw, Gears, Splines, and Worms.* 1973.

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TABLE E4 BEST-SIZE WIRE DIAMETER AND CONSTANTS FOR LARGE LEAD ANGLES, 1 in. AXIAL PITCH ACME THREADS (29 deg)

Lead Angle	Single-Start Threads		Two-Start Threads		Three-Start Threads		Four-Start Threads	
	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.
5.0	0.51450	0.64311	0.51443	0.64290	0.51441	0.64283	0.51440	0.64280
5.1	0.51442	0.64301	0.51435	0.64279	0.51433	0.64272	0.51431	0.64268
5.2	0.51434	0.64291	0.51427	0.64268	0.51424	0.64260	0.51423	0.64256
5.3	0.51426	0.64281	0.51419	0.64256	0.51416	0.64248	0.51415	0.64244
5.4	0.51418	0.64270	0.51410	0.64245	0.51407	0.64236	0.51406	0.64231
5.5	0.51410	0.64260	0.51401	0.64233	0.51398	0.64223	0.51397	0.64219
5.6	0.51402	0.64249	0.51393	0.64221	0.51390	0.64211	0.51388	0.64206
5.7	0.51393	0.64238	0.51384	0.64208	0.51380	0.64198	0.51379	0.64193
5.8	0.51385	0.64228	0.51375	0.64196	0.51371	0.64185	0.51369	0.64180
5.9	0.51376	0.64217	0.51365	0.64183	0.51362	0.64172	0.51360	0.64166
6.0	0.51367	0.64205	0.51356	0.64170	0.51352	0.64159	0.51350	0.64152
6.1	0.51358	0.64194	0.51347	0.64157	0.51343	0.64145	0.51341	0.64139
6.2	0.51349	0.64183	0.51337	0.64144	0.51333	0.64131	0.51331	0.64124
6.3	0.51340	0.64171	0.51327	0.64131	0.51323	0.64117	0.51321	0.64110
6.4	0.51331	0.64160	0.51317	0.64117	0.51313	0.64103	0.51310	0.64096
6.5	0.51321	0.64148	0.51307	0.64104	0.51302	0.64089	0.51300	0.64081
6.6	0.51312	0.64136	0.51297	0.64090	0.51292	0.64074	0.51289	0.64066
6.7	0.51302	0.64124	0.51287	0.64076	0.51281	0.64059	0.51279	0.64051
6.8	0.51292	0.64112	0.51276	0.64061	0.51270	0.64044	0.51268	0.64035
6.9	0.51282	0.64099	0.51265	0.64047	0.51260	0.64029	0.51257	0.64020
7.0	0.51272	0.64087	0.51254	0.64032	0.51248	0.64014	0.51245	0.64004
7.1	0.51262	0.64075	0.51244	0.64018	0.51237	0.63998	0.51234	0.63988
7.2	0.51251	0.64062	0.51232	0.64003	0.51226	0.63982	0.51223	0.63972
7.3	0.51241	0.64049	0.51221	0.63987	0.51214	0.63966	0.51211	0.63955
7.4	0.51230	0.64036	0.51210	0.63972	0.51203	0.63950	0.51199	0.63939
7.5	0.51220	0.64023	0.51198	0.63957	0.51191	0.63934	0.51187	0.63922
7.6	0.51209	0.64010	0.51187	0.63941	0.51179	0.63917	0.51175	0.63905
7.7	0.51198	0.63997	0.51175	0.63925	0.51167	0.63900	0.51163	0.63888
7.8	0.51187	0.63984	0.51163	0.63909	0.51155	0.63883	0.51150	0.63870
7.9	0.51176	0.63971	0.51151	0.63893	0.51142	0.63866	0.51138	0.63853
8.0	0.51164	0.63957	0.51138	0.63877	0.51130	0.63849	0.51125	0.63835
8.1	0.51153	0.63944	0.51126	0.63860	0.51117	0.63831	0.51112	0.63817
8.2	0.51141	0.63930	0.51113	0.63843	0.51104	0.63814	0.51099	0.63798
8.3	0.51130	0.63916	0.51101	0.63827	0.51091	0.63796	0.51086	0.63780
8.4	0.51118	0.63902	0.51088	0.63810	0.51078	0.63778	0.51073	0.63761
8.5	0.51106	0.63888	0.51075	0.63792	0.51064	0.63759	0.51059	0.63742
8.6	0.51094	0.63874	0.51062	0.63775	0.51051	0.63741	0.51045	0.63723
8.7	0.51082	0.63860	0.51049	0.63758	0.51037	0.63722	0.51032	0.63704
8.8	0.51069	0.63846	0.51035	0.63740	0.51024	0.63703	0.51018	0.63685
8.9	0.51057	0.63832	0.51022	0.63722	0.51010	0.63684	0.51004	0.63665
9.0	0.51044	0.63817	0.51008	0.63704	0.50996	0.63665	0.50989	0.63645
9.1	0.51032	0.63803	0.50994	0.63886	0.50981	0.63646	0.50975	0.63625
9.2	0.51019	0.63788	0.50980	0.63668	0.50967	0.63626	0.50960	0.63605
9.3	0.51006	0.63774	0.50966	0.63649	0.50953	0.63606	0.50946	0.63584
9.4	0.50993	0.63759	0.50952	0.63631	0.50938	0.63588	0.50931	0.63564

(continued)

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TABLE E4 BEST-SIZE WIRE DIAMETER AND CONSTANTS FOR LARGE LEAD ANGLES, 1 in. AXIAL PITCH ACME THREADS (29 deg) (CONT'D)

Lead Angle	Single-Start Threads		Two-Start Threads		Three-Start Threads		Four-Start Threads	
	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.
9.5	0.50980	0.63744	0.50938	0.63612	0.50923	0.63566	0.50916	0.63543
9.6	0.50967	0.63729	0.50923	0.63593	0.50908	0.63546	0.50901	0.63522
9.7	0.50954	0.63714	0.50909	0.63574	0.50893	0.63525	0.50885	0.63501
9.8	0.50940	0.63699	0.50894	0.63555	0.50878	0.63505	0.50870	0.63479
9.9	0.50927	0.63684	0.50879	0.63535	0.50863	0.63484	0.50854	0.63458
10.0	0.50913	0.63669	0.50864	0.63516	0.50847	0.63463	0.50839	0.63436
10.1	0.50899	0.63654	0.50849	0.63496	0.50832	0.63442	0.50823	0.63414
10.2	0.50886	0.63638	0.50834	0.63476	0.50816	0.63420	0.50807	0.63392
10.3	0.50872	0.63623	0.50818	0.63456	0.50800	0.63399	0.50790	0.63369
10.4	0.50858	0.63608	0.50803	0.63436	0.50784	0.63377	0.50774	0.63347
10.5	0.50843	0.63592	0.50787	0.63416	0.50767	0.63355	0.50758	0.63324
10.6	0.50829	0.63577	0.50771	0.63396	0.50751	0.63333	0.50741	0.63301
10.7	0.50815	0.63561	0.50755	0.63375	0.50735	0.63311	0.50724	0.63278
10.8	0.50800	0.63545	0.50739	0.63354	0.50718	0.63288	0.50707	0.63254
10.9	0.50786	0.63529	0.50723	0.63334	0.50701	0.63266	0.50690	0.63231
11.0	0.50771	0.63514	0.50706	0.63313	0.50684	0.63243	0.50673	0.63207
11.1	0.50756	0.63498	0.50690	0.63292	0.50667	0.63220	0.50655	0.63183
11.2	0.50741	0.63482	0.50673	0.63270	0.50650	0.63197	0.50638	0.63159
11.3	0.50726	0.63466	0.50657	0.63249	0.50632	0.63173	0.50620	0.63135
11.4	0.50711	0.63450	0.50640	0.63227	0.50615	0.63150	0.50602	0.63111
11.5	0.50696	0.63434	0.50623	0.63206	0.50597	0.63126	0.50584	0.63086
11.6	0.50680	0.63417	0.50605	0.63184	0.50579	0.63102	0.50566	0.63061
11.7	0.50665	0.63401	0.50588	0.63162	0.50562	0.63078	0.50548	0.63036
11.8	0.50649	0.63385	0.50571	0.63140	0.50543	0.63054	0.50530	0.63011
11.9	0.50634	0.63369	0.50553	0.63118	0.50525	0.63030	0.50511	0.62985
12.0	0.50618	0.63352	0.50536	0.63095	0.50507	0.63005	0.50492	0.62960
12.1	0.50602	0.63336	0.50518	0.63073	0.50488	0.62981	0.50474	0.62934
12.2	0.50586	0.63320	0.50500	0.63050	0.50470	0.62956	0.50455	0.62908
12.3	0.50570	0.63303	0.50482	0.63027	0.50451	0.62931	0.50435	0.62882
12.4	0.50554	0.63287	0.50463	0.63004	0.50432	0.62906	0.50416	0.62856
12.5	0.50538	0.63270	0.50445	0.62981	0.50413	0.62881	0.50397	0.62829
12.6	0.50522	0.63253	0.50427	0.62958	0.50394	0.62855	0.50377	0.62803
12.7	0.50505	0.63237	0.50408	0.62935	0.50374	0.62829	0.50357	0.62776
12.8	0.50489	0.63220	0.50389	0.62911	0.50355	0.62804	0.50337	0.62749
12.9	0.50472	0.63203	0.50370	0.62888	0.50335	0.62778	0.50317	0.62722
13.0	0.50455	0.63187	0.50351	0.62864	0.50316	0.62752	0.50297	0.62694
13.1	0.50438	0.63170	0.50332	0.62840	0.50296	0.62725	0.50277	0.62667
13.2	0.50421	0.63153	0.50313	0.62816	0.50276	0.62699	0.50257	0.62639
13.3	0.50404	0.63136	0.50294	0.62792	0.50255	0.62672	0.50236	0.62611
13.4	0.50387	0.63119	0.50274	0.62768	0.50235	0.62645	0.50215	0.62583
13.5	0.50370	0.63102	0.50255	0.62744	0.50215	0.62618	0.50194	0.62555
13.6	0.50353	0.63086	0.50235	0.62719	0.50194	0.62591	0.50173	0.62526
13.7	0.50335	0.63069	0.50215	0.62695	0.50173	0.62564	0.50152	0.62498
13.8	0.50318	0.63052	0.50195	0.62670	0.50152	0.62537	0.50131	0.62469
13.9	0.50300	0.63035	0.50175	0.62645	0.50131	0.62509	0.50109	0.62440

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TABLE E4 BEST-SIZE WIRE DIAMETER AND CONSTANTS FOR LARGE LEAD ANGLES, 1 in. AXIAL PITCH ACME THREADS (29 deg) (CONT'D)

Lead Angle	Single-Start Threads		Two-Start Threads		Three-Start Threads		Four-Start Threads	
	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.
14.0	0.50283	0.63018	0.50155	0.62620	0.50110	0.62481	0.50088	0.62411
14.1	0.50265	0.63001	0.50134	0.62595	0.50089	0.62454	0.50066	0.62381
14.2	0.50247	0.62983	0.50114	0.62570	0.50068	0.62426	0.50044	0.62352
14.3	0.50229	0.62966	0.50093	0.62545	0.50046	0.62397	0.50022	0.62322
14.4	0.50211	0.62949	0.50072	0.62520	0.50024	0.62369	0.50000	0.62292
14.5	0.50193	0.62932	0.50052	0.62494	0.50002	0.62341	0.49978	0.62262
14.6	0.50175	0.62915	0.50031	0.62468	0.49981	0.62312	0.49955	0.62232
14.7	0.50156	0.62898	0.50009	0.62443	0.49958	0.62283	0.49933	0.62202
14.8	0.50138	0.62881	0.49988	0.62417	0.49936	0.62254	0.49910	0.62171
14.9	0.50120	0.62863	0.49967	0.62391	0.49914	0.62225	0.49887	0.62141
15.0	0.50101	0.62846	0.49945	0.62365	0.49891	0.62196	0.49864	0.62110
15.1	0.50082	0.62829	0.49924	0.62338	0.49869	0.62166	0.49841	0.62079
15.2	0.50064	0.62812	0.49902	0.62312	0.49846	0.62137	0.49818	0.62047
15.3	0.50045	0.62795	0.49880	0.62286	0.49823	0.62107	0.49794	0.62016
15.4	0.50026	0.62777	0.49858	0.62259	0.49800	0.62077	0.49770	0.61985
15.5	0.50007	0.62760	0.49836	0.62232	0.49777	0.62047	0.49747	0.61953
15.6	0.49988	0.62743	0.49814	0.62206	0.49753	0.62017	0.49723	0.61921
15.7	0.49968	0.62726	0.49791	0.62179	0.49730	0.61987	0.49699	0.61889
15.8	0.49949	0.62708	0.49769	0.62152	0.49706	0.61956	0.49675	0.61857
15.9	0.49930	0.62691	0.49746	0.62125	0.49683	0.61926	0.49650	0.61824
16.0	0.49910	0.62674	0.49724	0.62097	0.49659	0.61895	0.49626	0.61792
16.1	0.49891	0.62656	0.49701	0.62070	0.49635	0.61864	0.49601	0.61759
16.2	0.49871	0.62639	0.49678	0.62043	0.49611	0.61833	0.49577	0.61726
16.3	0.49852	0.62622	0.49655	0.62015	0.49586	0.61802	0.49552	0.61693
16.4	0.49832	0.62605	0.49631	0.61987	0.49562	0.61770	0.49527	0.61660
16.5	0.49812	0.62587	0.49608	0.61959	0.49538	0.61739	0.49502	0.61627
16.6	0.49792	0.62570	0.49585	0.61932	0.49513	0.61707	0.49477	0.61593
16.7	0.49772	0.62553	0.49561	0.61904	0.49488	0.61676	0.49451	0.61559
16.8	0.49752	0.62536	0.49537	0.61876	0.49463	0.61644	0.49426	0.61525
16.9	0.49732	0.62518	0.49514	0.61847	0.49438	0.61612	0.49400	0.61491
17.0	0.49712	0.62501	0.49490	0.61819	0.49413	0.61579	0.49374	0.61457
17.1	0.49691	0.62484	0.49466	0.61791	0.49388	0.61547	0.49348	0.61423
17.2	0.49671	0.62466	0.49441	0.61762	0.49362	0.61515	0.49322	0.61388
17.3	0.49650	0.62449	0.49417	0.61733	0.49337	0.61482	0.49298	0.61354
17.4	0.49630	0.62432	0.49393	0.61705	0.49311	0.61449	0.49269	0.61319
17.5	0.49609	0.62415	0.49368	0.61676	0.49285	0.61416	0.49243	0.61284
17.6	0.49588	0.62398	0.49344	0.61647	0.49259	0.61383	0.49216	0.61249
17.7	0.49568	0.62380	0.49319	0.61618	0.49233	0.61350	0.49190	0.61213
17.8	0.49547	0.62363	0.49294	0.61589	0.49207	0.61317	0.49163	0.61178
17.9	0.49526	0.62346	0.49269	0.61560	0.49180	0.61283	0.49136	0.61142
18.0	0.49505	0.62329	0.49244	0.61530	0.49154	0.61250	0.49108	0.61106
18.1	0.49484	0.62312	0.49219	0.61501	0.49127	0.61216	0.49081	0.61070
18.2	0.49462	0.62295	0.49193	0.61471	0.49100	0.61182	0.49054	0.61034
18.3	0.49441	0.62277	0.49168	0.61442	0.49074	0.61148	0.49026	0.60998
18.4	0.49420	0.62260	0.49142	0.61412	0.49047	0.61114	0.48998	0.60962

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TABLE E4 BEST-SIZE WIRE DIAMETER AND CONSTANTS FOR LARGE LEAD ANGLES, 1 in. AXIAL PITCH ACME THREADS (29 deg) (CONT'D)

Lead Angle	Single-Start Threads		Two-Start Threads		Three-Start Threads		Four-Start Threads	
	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.	$W1$, in.	$(C + c)1$, in.
18.5	0.49398	0.62243	0.49117	0.61382	0.49019	0.61079	0.48970	0.60925
18.6	0.49377	0.62226	0.49091	0.61352	0.48992	0.61045	0.48942	0.60888
18.7	0.49355	0.62209	0.49065	0.61322	0.48965	0.61010	0.48914	0.60851
18.8	0.49334	0.62192	0.49039	0.61292	0.48937	0.60976	0.48886	0.60814
18.9	0.49312	0.62175	0.49013	0.61262	0.48910	0.60941	0.48858	0.60777
19.0	0.49290	0.62158	0.48986	0.61232	0.48882	0.60906	0.48829	0.60740
19.1	0.49268	0.62141	0.48960	0.61201	0.48854	0.60871	0.48800	0.60702
19.2	0.49247	0.62124	0.48933	0.61171	0.48826	0.60835	0.48771	0.60665
19.3	0.49225	0.62107	0.48907	0.61140	0.48798	0.60800	0.48742	0.60627
19.4	0.49203	0.62091	0.48880	0.61110	0.48769	0.60765	0.48713	0.60589
19.5	0.49180	0.62074	0.48853	0.61079	0.48741	0.60729	0.48684	0.60551
19.6	0.49158	0.62057	0.48826	0.61048	0.48712	0.60693	0.48655	0.60512
19.7	0.49136	0.62040	0.48799	0.61017	0.48684	0.60657	0.48625	0.60474
19.8	0.49114	0.62023	0.48772	0.60986	0.48655	0.60621	0.48596	0.60435
19.9	0.49091	0.62007	0.48745	0.60955	0.48626	0.60585	0.48566	0.60396
20.0	0.49069	0.61990	0.48717	0.60924	0.48597	0.60549	0.48536	0.60358
20.1	0.49046	0.61973	0.48690	0.60892	0.48567	0.60512	0.48506	0.60318
20.2	0.49024	0.61957	0.48662	0.60861	0.48538	0.60476	0.48476	0.60279
20.3	0.49001	0.61940	0.48634	0.60829	0.48509	0.60439	0.48445	0.60240
20.4	0.48978	0.61923	0.48606	0.60798	0.48479	0.60402	0.48415	0.60200
20.5	0.48956	0.61907	0.48578	0.60766	0.48449	0.60365	0.48384	0.60161
20.6	0.48933	0.61890	0.48550	0.60734	0.48420	0.60328	0.48354	0.60121
20.7	0.48910	0.61874	0.48522	0.60702	0.48390	0.60291	0.48323	0.60081
20.8	0.48887	0.61857	0.48494	0.60670	0.48359	0.60253	0.48292	0.60041
20.9	0.48864	0.61841	0.48465	0.60638	0.48329	0.60216	0.48261	0.60000
21.0	0.48841	0.61825	0.48437	0.60606	0.48299	0.60178	0.48229	0.59960
21.1	0.48817	0.61808	0.48408	0.60574	0.48268	0.60140	0.48198	0.59919
21.2	0.48794	0.61792	0.48379	0.60542	0.48238	0.60102	0.48167	0.59879
21.3	0.48771	0.61776	0.48351	0.60509	0.48207	0.60064	0.48135	0.59838
21.4	0.48748	0.61759	0.48322	0.60477	0.48176	0.60026	0.48103	0.59797
21.5	0.48724	0.61743	0.48292	0.60444	0.48145	0.59988	0.48071	0.59756
21.6	0.48701	0.61727	0.48263	0.60412	0.48114	0.59950	0.48039	0.59714
21.7	0.48677	0.61711	0.48234	0.60379	0.48083	0.59911	0.48007	0.59673
21.8	0.48654	0.61695	0.48204	0.60346	0.48051	0.59872	0.47975	0.59631
21.9	0.48630	0.61679	0.48175	0.60313	0.48020	0.59834	0.47942	0.59589
22.0	0.48606	0.61663	0.48145	0.60280	0.47988	0.59795	0.47910	0.59547
22.1	0.48582	0.61647	0.48115	0.60247	0.47957	0.59756	0.47877	0.59505
22.2	0.48559	0.61631	0.48086	0.60214	0.47925	0.59716	0.47844	0.59463
22.3	0.48535	0.61615	0.48056	0.60181	0.47893	0.59677	0.47811	0.59421
22.4	0.48511	0.61599	0.48025	0.60147	0.47861	0.59638	0.47778	0.59378
22.5	0.48487	0.61584	0.47995	0.60114	0.47828	0.59598	0.47745	0.59336
22.6	0.48463	0.61568	0.47965	0.60081	0.47796	0.59558	0.47711	0.59293
22.7	0.48439	0.61552	0.47935	0.60047	0.47764	0.59519	0.47678	0.59250
22.8	0.48414	0.61537	0.47904	0.60013	0.47731	0.59479	0.47644	0.59207
22.9	0.48390	0.61521	0.47873	0.59980	0.47698	0.59439	0.47611	0.59164
23.0	0.48366	0.61506	0.47843	9.59946	0.47665	0.59399	0.47577	0.59120
23.1	0.48342	0.61490	0.47812	0.59912	0.47632	0.59358	0.47543	0.59077

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NONMANDATORY APPENDIX F
BALL METHOD FOR MEASUREMENT OF INTERNAL PITCH DIAMETER OF 29 deg ACME SCREW THREADS

F1 SPECIFICATIONS FOR ACME BALLS

The balls shall be accurately finished, hardened alloy tool steel, tungsten carbide, or sapphire. Best-size balls shall have the same spherical diameter as best-size wires (see Table E1) within 0.000010 in. and have a common diameter within 0.000020 in. Balls are measured between flat steel contacts at 2 oz force. Ball requirements apply before assembling the single-ball probe, Tee-ball probe, or star-ball probe.

Usually a limited number of ball sizes are supplied with instruments using ball probes, for economical reasons, resulting in the need for a correction to pitch diameter due to flank angle variation from nominal size.

F2 MEASURING FORCE AND DEFORMATION

Measuring force depends on the type of instrument. Coordinate measuring machines use force under 1 oz to measure internal threads under 0.750 in. to reduce uncertainty from deformation and stem bending and reduce the danger of breaking the probe. The more rigid stems used on Tee-probe measuring machines experience less danger of breakage, and such stems can be used at force above 2 oz.

Contact deformation between ball and thread groove, or plain master ring, is mostly compensated by the ball calibration method. The deformation error is small in comparison to the geometric helical thread form variations in a manufactured gage or product.

F3 COMPUTING INTERNAL PITCH DIAMETER

The procedure in section E4 is applicable for internal single- and multiple-start Acme threads when Eq. (1) is modified as shown below and for determining the ball correction $(C + c)$ as detailed in section E4 for wires.

$$D_2 = M_b - 2B - 0.5P \cot \alpha + B\,(1 + \operatorname{cosec} \alpha')$$
$$D_2 = M_b - 2B + (C + c)$$

NOTE: If measurement under balls is used, term 2B is not applicable.

where

B = average ball diameter
$(C + c)$ = ball correction
$= 0.5P \cot \alpha + B\,(1 - \operatorname{cosec} \alpha')$
D_2 = internal pitch diameter
L = lead
$= P/n$ (it replaces P for multiple-start Acme threads)
M_b = diameter over balls
P = pitch (preferably the measured pitch)
n = threads/in.
α = half angle of Acme thread, deg (preferably the measured half angle in the axial plane)
α' = $\tan^{-1}(\tan \alpha \cos \lambda)$
λ = lead angle at pitch diameter
$= \tan^{-1}(L / 3.1416 D_2)$

Best-size balls (B) are the same size as the listed wire sizes (w) in Table E1. The values corresponding to $0.5P \cot \alpha$ and $w(1 + \operatorname{cosec} \alpha')$ for external threads in section E4, based on Vogel's β_{800} formula, are identical for internal single- and multiple-start threads.

F4 BALL PROBE MEASURING INSTRUMENTS FOR INTERNAL PITCH DIAMETER

There are three types of instruments: horizontal comparators using single-ball and Tee-ball probe; direct-measuring instruments using single-ball, Tee-ball, and star-ball probe; and radial comparators using single-ball probe (see Fig. F1). Mechanical operation and instrument designs are described in manufacturer's manuals.

F4.1 Horizontal Comparator for Internal Pitch Diameter Measurement

One type of instrument uses a Tee-shaped ball stylus coupled to a measuring device. The measuring principle is illustrated in Fig. F2. A calibrated, plain-ring gage is used to determine the double-probe length. Two readings are taken when the stylus contacts opposite

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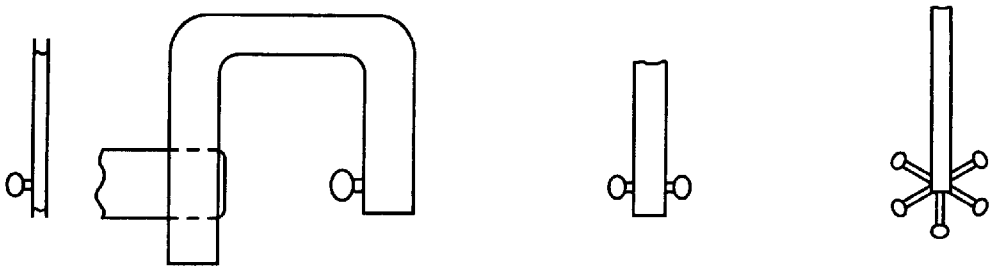


FIG. F1 HORIZONTAL COMPARATOR PROBES

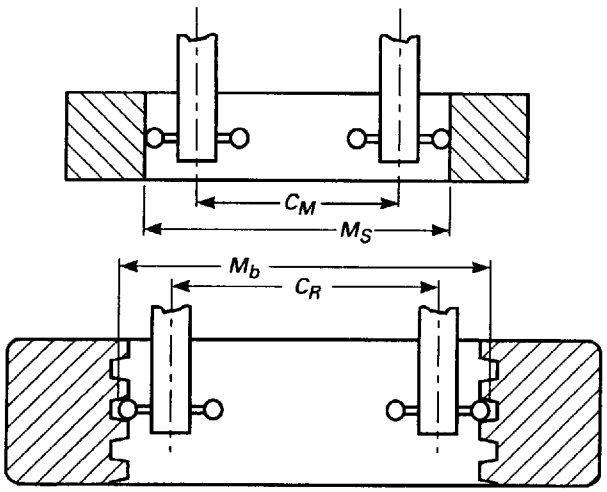


FIG. F2 PITCH-DIAMETER MEASUREMENT WITH TEE-BALL PROBE

sides of the plain ring. The measured reading difference is C_M. The difference between the calibrated ring value (M_s) and measured C_M is the probe length. The plain ring is replaced on the adjustable table with the test thread. The over-ball diameter measurement is made between opposite threads. Since the opposite thread in the line of measurement is a half pitch above or below, the table elevation requires adjustment. The required measurements for determining over-balls length (M_b) are shown below.

$$M_s - C_M = \text{actual Tee probe length}$$
$$M_b = (M_s - C_M) + C_R$$

where

C_M = probe travel in ring
C_R = measurement of double probe travel between opposite internal threads
M_s = diameter of plain ring

The value M_b, measurement over balls, can be inserted into the first equation above. Then the internal pitch diameter can be calculated with value for $C + c$ in section E4, except the wire diameter (w) is replaced by the average ball diameter.

A different equation, used by available internal-pitch-diameter–measuring instruments, is as follows:

$$D_2 = C_R + (M_s - C_M) - 0.5P \cot \alpha + B(\text{cosec } \alpha - 1) + C$$

When lead angle (λ) is less than 10 deg, $C = 0.5B \tan^2\lambda \cos \alpha \cot \alpha$.

When λ is equal to or greater than 10 deg but less than 20 deg, C (the helix correction) = 0 and α (the axial half angle) is replaced in the equation by α', the average normal half angle.

Thus

B = average diameter of balls
C_M = double-probe reading on ring gage
C_R = double-probe reading on internal thread
L = lead
= P / n for multiple-start threads
M_s = calculated value for plain-ring gage
$(M_s - C_M)$ = double-probe length
P = pitch
α = average axial half angle
α' = $\tan^{-1}$ ($\tan \alpha \cos \lambda$)
= normal half angle
λ = $\tan^{-1}(L / 3.1416D_2)$
= helix angle at pitch diameter

F4.2 Direct-Measuring Instrument for Internal Pitch Diameter

Coordinate measuring machines use all three types of probes. It can be used as a horizontal comparator,

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direct-reading instrument, or a radial comparator provided it has a rotary table accessory. By following the manufacturer's procedures and using the manufacturer's computer software, the distance between ball centers can be determined when they contact opposite thread grooves. By adding the ball diameter to the measured distance between ball centers, a value for over the balls (M_b) is obtained. Corrections for stylus bending can be included. The pitch diameter can now be computed using the first equation in section F3 and procedures in section E4.

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NONMANDATORY APPENDIX G
GO GAGE FUNCTIONAL SIZE COMPENSATION, FLANK ANGLE CORRECTION, LIMIT GAGING OF SETTING RING, AND GAGING PROBLEM AREAS

G1 GO GAGE FUNCTIONAL SIZE COMPENSATION[1]

G1.1 Manufacturing Principles

The principles have been established in the foregoing requirements that Go gages should approximate the length of engagement, LE, and that the Not Go gages should be three pitches long. For reasons of economy or limitations in gage manufacture or use, it may be desirable to modify these principles to:

(a) take advantage of the economies of using standard blanks, as listed in ASME B47.1 (see Table 18), wherever they may be utilized successfully;

(b) avoid too cumbersome ring gages as well as excessively expensive gages by limiting the length of the Go thread ring gages to lengths listed in ASME B47.1 (see Table 18);

(c) avoid excessively cumbersome thread plug gages by limiting to lengths listed in ASME B47.1 (see Table 18); and

(d) take full advantage of modern equipment for producing and checking accurate leads, particularly where long engagements are involved, thus permitting the use of moderate-length thread plug and thread ring gages.

The product maximum-material sizes are based on an allowance (see Table 9). When plug and ring gages are used that do not match the length of engagement, a change in the maximum-material pitch diameter size may be required because less lead variation exists in a shorter sample length.

The allowance can be increased as shown in the following examples. This arbitrarily reduces the tolerance on diameter.

G1.2 Application and Example

Based on a maximum lead variation effect of one-half the class 4G or 4C pitch diameter tolerance, the maximum pitch diameter of the Go functional gage for external threads in Table 19 is reduced and minimum pitch diameter of the Go functional working plug gage for the internal threads in Table 19 is increased by an amount calculated from the following equation:

$$\Delta d_2\lambda \text{ or } \Delta D_2\lambda = (1 - LG / LE)\ (0.5\ Td_2) \text{ or } (0.5\ TD_2)$$

where

LE = length of engagement
LG = length of Go functional gage
Td_2 or TD_2 = pitch diameter tolerance for Class 4G or 4C

This changes the permissible functional size of the Go gage but does not change the minimum-material pitch diameter.

If the Go functional size of the gaging member is to be based on the product length of engagement, use the equation to calculate the change.

EXAMPLE: 1.000-5-ACME-4G
Product assembly with 1.500 in. internal thread length and 3.000 in. external thread length; limit gage length (LG) is 0.9375 in. ring gage, 1.000 in. plug gage.

Determine Go pitch diameter and limits for thread setting plug gage and thread working plug gage.

Acme product pitch diameter size and tolerance:
External thread: 0.8960 in., max.; 0.8895 in., min.; 0.0065 in. tolerance
Internal thread: 0.9000 in., min.; 0.9065 in., max.; 0.0065 in. tolerance

Calculated change in Go pitch diameter for gages:

$$d_2 = (1 - 0.9375 / 1.5)\ (0.5 \times 0.0065) =$$
0.0012 in. correction to Go ring pitch diameter

[1] Where length of engagement (LE) is greater than the gage length in ASME B47.1.

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D_2 = (1 − 1.0000 / 1.5) (0.5 × 0.0065) = 0.0011 correction to Go plug pitch diameter

Go functional setting plug gage size:

0.8960 max. pitch diameter − 0.0012 correction = 0.8948 max. gage pitch diameter

New Go gage size: 0.8948 max. gage pitch diameter;

0.8948 max. gage pitch diameter − 0.0008 gage tolerance = 0.8940 min. gage pitch diameter

Go functional working plug gage size:

0.9000 min. pitch diameter + 0.0011 correction = 0.9011 min. gage pitch diameter

New Go gage size: 0.9011 min. gage pitch diameter;

0.9011 min. gage pitch diameter + 0.0008 gage tolerance = 0.9019 max. gage pitch diameter

If a Go gage shorter than the length of engagement is chosen, independent means should be used to measure lead and angle variation in product.

G1.3 Alternate Procedure Using Measuring Instruments

When independent measurements must be used for checking diameters, maximum lead variation, and average flank angle variations from nominal, a calculation of functional diameter may be made.

For external thread, add to the measured pitch diameter 3.867 times the lead variation over the length of engagement of the smaller assembly member and 0.036P times the average flank angle variation from nominal.

For internal thread, subtract these values from the measured pitch diameter. Results shall not be outside of the pitch diameter limits.

G2 CALCULATION OF HALF ANGLE

When flank angle, measured normal to the lead angle by optical projection, has a lead angle of 5 deg and greater, the flank angle shall be calculated and be within tolerance.

CAUTION: Both gage manufacturers and product manufacturers shall make this correction.

To determine the half angle from the measured half angle normal to the lead angle, use the following equation:

$$\alpha = \tan^{-1}(\tan \alpha_N / \cos \lambda)$$

where

α = half angle, deg
α_N = measured half angle, deg, normal to the lead angle
λ = lead angle, deg, at pitch diameter

G3 SUGGESTED METHODS FOR CHECKING THE PITCH DIAMETER SIZE OF THE SOLID SETTING RING MASTER[2]

G3.1 Method 1

(a) Use a Go check plug made to minimum major diameter (see Table 22) and minimum pitch diameter size at ring limit plus 0.5 × Class 4G/4C pitch diameter tolerance shown in Table 17 or 24.

(b) Use a Not Go check plug made to minimum major diameter and maximum pitch diameter size at ring gage limit (see Table 22) minus 0.5 × Class 4G/4C pitch diameter tolerance shown in Tables 17 and 24.

G3.2 Method 2

(a) Use a Go truncated check plug made to minimum pitch diameter size of ring gage limit (see Table 22) plus 0.5 × Class 4G/4C pitch diameter tolerance shown in Table 17 or 24. Flank of Go check plug shall be from 0.05P above to 0.05P below the pitch diameter with 3 threads of engagement.

(b) Use a Not Go truncated check plug made to maximum pitch diameter size of ring gage limit (see Table 22) minus 0.5 × Class 4G/4C pitch diameter tolerance (see Table 17 or 24). Flank of Not Go check plug should be 0.05P above and 0.05P below the pitch diameter with 3 threads of engagement.

(c) Go full-form check plug made to minimum major diameter (see Table 22) and minimum pitch diameter size of ring limit plus 0.5 × Class 4G/4C pitch diameter tolerance (see Table 17 or 24).

G4 GAGING PROBLEM AREAS

Manufactured Acme screw thread assemblies, and especially multiple-start Acme screw thread assemblies,

[2] When measuring instrument is not available.

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often have problems when members of an assembly are split between manufacturers. This is caused by some of the following:

(a) transfer of pitch diameter from setting plug gage to adjustable ring or working indicator gage; uncertainties range from 0.0002 in. through 0.0014 in. on 60 deg threads and probably greater on Acme thread; it is greater for functional size;

(b) uncertainty in optical measurement of flank angles on threads with large lead angles and failure to convert measured flank angle, which is normal to the lead angle, to the flank angle;

(c) using simplified pitch diameter equations from many sources;

(d) using nominal lead and flank angles when measured values should be used;

(e) poor indexing of starts;

(f) problems in interpreting this Standard;

(g) assortment of Go and Not Go length of engagement when lead variations are present;

(h) using zero lead roll indicating gage contacts on multiple-start threads (do not use zero lead pitch diameter and functional size indicating gage rolls when lead angle is 5 deg and greater);

(i) questionable determination of functional size and cording of functional segment gages; presence of burrs;

(j) using indicating gages when lead and flank angles deviate from nominal size;

(k) using indicating gage contacts with poor geometry;

(l) alternate or equivalent gaging failing to yield acceptable values;

(m) simplified pitch diameter practice is not acceptable for multiple-start threads; only true pitch diameter, calculated from measured pitch, lead including index, number of starts, and flank angles, may permit interchangeability between independent manufacturers of Acme assemblies, except for threads with very large lead angles; and

(n) multiple-start external and internal thread gages with more than 5 starts should be made by the same manufacturer; multiple-start product assemblies should be made by the same manufacturer to avoid assembly problems.

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NONMANDATORY APPENDIX H
TOLERANCES FOR ACME SCREW THREAD GAGES OVER 5.000 in.

The Acme Screw Thread Standard is limited to a range of 0.250 in. through 5.000 in. Since the standard series is inadequate for many specialized industrial needs, extended gage tolerances up to 21.000 in. are provided for both general purpose and centralized Acme threads. See Table H1 for general purpose Acme threads and Table H2 for centralizing Acme threads. In the Standard, there are equations and interpretation instructions for extending product tolerances to the greater range. Table H3 extends plain-gage tolerances.

TABLE H1 EXTENDED TOLERANCES FOR GO AND NOT GO THREAD GAGES, WORKING AND SETTING, GENERAL PURPOSE SINGLE-START ACME THREADS (ABOVE 5 in. THROUGH 21 in.)

	Above 5 in. Through 10 in. Tolerance on Pitch Diameter		Above 10 in. Through 15.5 in. Tolerance on Pitch Diameter		Above 15.5 in. Tolerance on Pitch Diameter		Tolerances on Major and Minor Diameters	Tolerance on Flank Angle ±	
Threads/in.	Class 2G	Classes 3G and 4G	Class 2G	Classes 3G and 4G	Class 2G	Classes 3G and 4G		deg	min
16	0.0008	0.0007	0.0010	0.0008	0.0012	0.0010	0.001	0	10
14	0.0008	0.0007	0.0010	0.0008	0.0012	0.0010	0.001	0	10
12	0.0008	0.0008	0.0010	0.0008	0.0012	0.0012	0.001	0	10
10	0.0008	0.0008	0.0012	0.0010	0.0014	0.0012	0.002	0	10
8	0.0011	0.0009	0.0013	0.0010	0.0016	0.0014	0.002	0	8
6	0.0012	0.0009	0.0015	0.0012	0.0018	0.0014	0.002	0	8
5	0.0013	0.0011	0.0017	0.0012	0.0020	0.0016	0.002	0	8
4	0.0015	0.0011	0.0018	0.0013	0.0022	0.0016	0.002	0	8
3	0.0017	0.0011	0.0022	0.0013	0.0026	0.0016	0.002	0	6
2½	0.0019	0.0012	0.0023	0.0015	0.0028	0.0016	0.002	0	6
2	0.0020	0.0013	0.0025	0.0017	0.0030	0.0020	0.002	0	6
1½	0.0024	0.0013	0.0030	0.0017	0.0032	0.0020	0.002	0	5
1⅓	0.0024	0.0013	0.0030	0.0017	0.0036	0.0020	0.002	0	5
1	0.0028	0.0013	0.0035	0.0017	0.0042	0.0020	0.002	0	5

GENERAL NOTE: See para. 4.4.3 for lead tolerances.

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TABLE H2 EXTENDED TOLERANCES FOR GO AND NOT GO THREAD GAGES FOR CENTRALIZING SINGLE-START ACME THREADS (ABOVE 5 in. THROUGH 21 in.)

Threads/in.	Tolerance on Pitch Diameters		Tolerance on Major Diameter of Go Thread Plug and Not Go Plug for Internal Thread	Tolerance on Major Diameter of Not Go Plug Gage and Minor Diameter of Go and Not Go Thread Ring Gage	Tolerance on Flank Angle	
	Class 2C	Classes 3C and 4C			deg	min
10	0.0014	0.0012	0.0004	0.002	0	10
8	0.0016	0.0014	0.0004	0.002	0	8
6	0.0018	0.0014	0.0004	0.002	0	8
5	0.0020	0.0016	0.0004	0.002	0	8
4	0.0022	0.0016	0.0005	0.002	0	8
3	0.0026	0.0016	0.0006	0.002	0	6
2½	0.0028	0.0018	0.0007	0.002	0	6
2	0.0030	0.0020	0.0008	0.002	0	6
1½	0.0036	0.0020	0.0008	0.002	0	5
1⅓	0.0036	0.0020	0.0008	0.002	0	5
1	0.0042	0.0020	0.0008	0.002	0	5

GENERAL NOTE: See para. 5.1.3 for lead tolerances.

TABLE H3 EXTENDED PLAIN GAGE TOLERANCES

Size Range		Tolerances for Plain Gages
Above	To and Including	
6.510	9.010	0.00032
9.010	12.010	0.0004
12.010	15.010	0.0006
15.010	18.010	0.0008
18.010	21.010	0.0010

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NONMANDATORY APPENDIX I
DETERMINING LIMITS OF SIZE FOR MULTIPLE-START DIAMETER/PITCH COMBINATIONS

Gage manufacturers are required to provide industry with modifications to Acme screw threads. This Appendix gives several examples.

EXAMPLE: Two-start Acme thread assembly, 4G and 3G; 0.750-0.125P-0.250L-ACME-4G external thread; 0.750-0.125P-0.250L-ACME-3G internal thread; length of engagement of smallest member of this assembly is 2.000 in.

(a) External Thread

(1) Major diameter:

$d\ max.$ = $d\ bsc$ = 0.750 in.
$d\ min.$ = $d\ max.$ − Td (Table 4)
$d\ min.$ = 0.750 in. − 0.0062 in. = 0.7438 in.

(2) Pitch diameter:

$d_2\ max.$ = $d\ max.$ − $P/2$ − (es) (Table 9)
$d_2\ max.$ = 0.750 in. − 0.0625 in. − 0.0035 in. = 0.6840 in.
$d_2\ min.$ = $d\ max.$ − Td_2 (Table 7)
$d_2\ min.$ = 0.6840 in. − 0.005268 in. = 0.6787 in.

(3) Minor diameter:

$d_1\ max.$ = $d\ max.$ − P − (es) (Table 4)
$d_1\ max.$ = 0.750 in. − 0.125 in. − 0.020 in. = 0.6050 in.
$d_1\ min.$ = $d_1\ max.$ − $1.5(Td_2)$ (Table 7)
$d_1\ min.$ = 0.6050 in. − 0.007902 in. = 0.5971 in.

(b) Internal Thread. See Appendix B for adjusted allowances.

(1) Major diameter:

$D\ min.$ = $d\ max.$ + (EI) (Table 4)
$D\ min.$ = 0.750 in. + 0.020 in. = 0.7700 in.
$D\ max.$ = $D\ min.$ + TD (Table 4) + 50%(es)
[para. B2.2(a), Table 9]
$D\ max.$ = 0.7700 in. + 0.020 in. + 0.0026 in. = 0.7926 in.

(2) Pitch diameter:

$D_2\ min.$ = $d\ max.$ − $P/2$
$D_2\ min.$ = 0.750 in. − 0.0625 in. = 0.6875 in.
$D_2\ max.$ = $D_2\ min.$ + TD_2 (Table 6) + 50% (es)
[para. B2.2(a), Table 9]
$D_2\ max.$ = 0.6875 in. + 0.007375 in. + 0.0026 in.
= 0.6975 in.

(3) Minor diameter:

$D_1\ min.$ = $d\ max.$ − P
$D_1\ min.$ = 0.750 in. − 0.125 in. = 0.6250 in.
$D_1\ max.$ = $D_1\ min.$ + TD_1 (Table 4) + 50% (es)
[para. B2.2(a), Table 9]
$D_1\ max.$ = 0.6250 in. + 0.0062 in. + 0.0026 in.
= 0.6338 in.

NOTE: The smallest member of this assembly is greater than 2 diameters. The correction in Appendix G1 does not apply to product limits. It applies to the Go thread plug gage.

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