BRITISH STANDARD

BS 84:1956

Specification for

Parallel screw threads of Whitworth form

UDC 621.882.082.2

Co-operating organizations

The Mechanical Engineering Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:—

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British Bolt, Nut, Screw and Rivet Federation
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Engineering Standards Co-ordinating Committee
Gauge and Tool Makers' Association
Ground Thread Tap Association
Machine Tool Trades Association
National Association of Marine Engine Builders
Scientific Instrument Manufacturers' Association
Society of British Aircraft Constructors
Society of Motor Manufacturers and Traders Ltd.
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This British Standard, having been approved by the Mechanical Engineering Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 26 September 1956

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Amendments issued since publication

Amd. No.	Date	Comments

Contents

Foreword

This standard makes reference to the following British Standards:

BS 919, *Screw gauge limits and tolerances.*

BS 1157, *Tapping drill sizes.*

BS 1916, *Pt. 2. Guide to the selection of fits.*

BS 2517, *Definitions for use in mechanical engineering.*

This revised British Standard has been prepared, under the authority of the Mechanical Engineering Industry Standards Committee, to supersede BS 84:1940, "*Screw threads of Whitworth form*". It applies to threads of Whitworth form used for general engineering purposes and is not intended to apply to special applications such as those requiring interference fits.

The standard includes tables of basic sizes, limits and tolerances for British Standard Whitworth (B.S.W.) and British Standard Fine (B.S.F.) screw threads. In addition it now provides a "Selected Thread" series of recommended diameter-pitch combinations for use in applications where the standard coarse (B.S.W.) and fine (B.S.F.) pitch series have insufficiently fine pitches.

The British Standard Pipe parallel thread series was incorporated in BS 84:1940 as a fine thread series for general engineering purposes, and though this series was not intended for pipe joints it has been extensively used on certain types of pipe fittings, such as unions, compression type connections, etc., where the pressure seal is not made on the threads. This has caused some confusion with the pipe threads specified in BS 21[1)] where the pressure seal is, in fact, made on the threads. It has, therefore, been decided to publish the tables of basic sizes, limits and tolerances for the British Standard Pipe parallel thread series given in BS 84:1940 in a new standard, BS 2779, "*Fastening Threads of B.S.P. Sizes,*" now in course of preparation. This standard, in addition to BS 21, which is now being revised, will come under the aegis of the Pipe Threads Committee of BSI and these two standards will then include recommended limits and tolerances for all B.S.P. threads whether or not the pressure seal is made upon the threads.

The new "Selected Thread" series will, in most cases, be more suitable for use in new designs than the BS Pipe parallel thread series in cases where an extra fine pitch thread is required, and its use is strongly recommended.

In revising this standard, advantage has been taken of the experience gained in the use of BS 84:1940, to modify it to conform to modern thread tolerancing practice. Thus an allowance (minimum clearance) is provided on certain classes of bolts of sizes up to and including $^3/_4$ in. diameter; the recommended associations of classes of bolts and nuts include nuts having larger effective diameter tolerances than the corresponding sizes of bolts. Three classes of tolerance are provided for bolts, the Close, Medium and Free Classes, equivalent to the old Close, Medium and Free Fit bolts. The allowance is provided on bolts in the Medium and Free Classes by reducing the maximum bolt limits below basic size. The purpose of this allowance is to provide for the threads to be plated if necessary, the plating encroaching within the allowance; it also guarantees easy assembly of maximum metal bolts and nuts, thus facilitating the use of torque wrenches. Two classes of tolerance for nuts are recommended, a Medium Class and Normal Class, identical with the old Medium and Free Fit nuts respectively. The old Close Fit (now termed Close Class) nuts, are now regarded as non-preferred but, in view of their usage in the past and for special needs, their limits and tolerances are given in an Appendix to the standard.

All screw threads made in accordance with this revised standard will assemble with the corresponding nominal sizes of mating screw threads made to BS 84:1940.

[1)] BS 21, "*Pipe threads*".

It will be observed that no change has been made in the general three-part formula used as a basis for tolerancing effective diameters, and the formulae used for tolerancing the other thread elements also remain unchanged from those in BS 84:1940; the reason for this is to minimize any changes in the sizes of the gauges used to control the size of the finished work.

The table of recommended diameter-pitch combinations for screw threads in the "Selected Thread" series follows very closely the corresponding Table in BS 1580, "*Unified Screw Threads*".

In revising the standard the following amendments issued subsequent to BS 84:1940 have been incorporated in the text, with the exception of that part of the amendments dealing with B.S.P. threads, and Amendments Nos. 1 and 2 have been restricted to lengths of engagement of bolt and nut up to 15 pitches.

Amendment No. 1, *June* 1942, provided simplified tables of tolerances for threads not in the three standard diameter-pitch series (B.S.W., B.S.F. and B.S.P.), based on a length of engagement of bolt and nut of 10 pitches, but applicable in practice to all reasonable lengths of engagement.

Amendment No. 2, *April* 1943, specified that the tolerances given in the three standard diameter-pitch series should apply to all lengths of engagement.

Amendment No. 3, *August* 1945, provided information about truncated Whitworth form screw threads.

Amendment No. 4, *December* 1949, gave extensions of tables of limits and tolerances for the larger sizes of standard diameter-pitch combinations of Whitworth form.

In conclusion it may be asked why the revision of this standard has been undertaken in view of the standardization of the Unified thread in BS 1580. The reason is that Whitworth threads will undoubtedly continue to be used for many years, especially on replacements or spare parts.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 47 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard relates to parallel screw threads, having the Whitworth form of thread, used for general engineering purposes. It is not intended to apply to threaded pipe joints, screw threads associated with interference fits, such as those on the "metal-ends" of studs and in the corresponding tapped holes, or to screw threads which are subject to high temperature.

This standard includes:

a) A coarse thread series, the British Standard Whitworth (B.S.W.) Series, from $^1/_8$ in. to 6 in. diameter.

b) A fine thread series, the British Standard Fine (B.S.F.) Series, from $^3/_{16}$ in. to $4^1/_4$ in. diameter.

NOTE The tables of limits and tolerances in the B.S.F. Series extend up to the 3 in. size only, since nominal sizes above 3 in. are rarely used.

c) A supplementary Selected Thread Series from $^1/_4$ in. diameter upwards.

d) Screw threads of Truncated Whitworth form (Appendix A). Supplementary information is given in Appendix A to Appendix E.

2 Nomenclature and definitions

For the nomenclature and definitions of terms used in this standard, see BS 2517, "*Definitions for use in Mechanical Engineering*".

3 Form of Whitworth screw thread

The basic (and design) form of the Whitworth thread is shown in Figure 1. It is a symmetrical V-thread in which the angle between the flanks, measured in an axial plane, is 55°; one-sixth of the sharp vee is truncated at top and bottom, the thread being rounded equally at crests and roots by circular arcs blending tangentially with the flanks, the theoretical depth of thread being thus 0.640327 times the nominal pitch.

The basic thread depths calculated from the above definition are rounded off to the nearest 0.0001 in.

4 Classes of bolts and nuts

Three classes of tolerances for bolts and two classes for nuts[2)] are provided as follows:

Close class bolts. The close class[3)] applies to screw threads requiring a fine snug fit, obtainable consistently only by the use of the highest quality production equipment supported by a particularly efficient system of gauging and inspection. It should be used only for special work where refined accuracy of pitch and thread form are particularly required.

Medium class bolts and nuts. The medium class applies to the better class of ordinary interchangeable screw threads.

Free class bolts. The free class applies to the majority of bolts of ordinary commercial quality.

Normal class nuts. The normal class applies to ordinary commercial quality nuts; this class is intended for use with medium or free class bolts.

The relative magnitudes and dispositions of the effective diameter tolerance zones[4)] for the recommended combinations of classes are shown in Figure 2.

It will be noted that the lower limit of the nut is always basic size. No allowance is provided for close class bolts, but for medium and free class bolts an allowance is provided between the lower limit for the nut (basic size) and the upper limit for the bolt on sizes $^3/_4$ in. nominal diameter and below. The allowance amounts to 0.3 × medium class bolt effective diameter tolerance for nominal sizes of $^3/_4$ in. down to $^1/_4$ in. The allowance for nominal sizes less than $^1/_4$ in. is the same as that for the $^1/_4$ in. size.

Since it is more difficult to control the threading of nuts than bolts the recommended classes of nuts to be associated with close and medium class bolts have effective diameter tolerances 50 per cent greater than those of the associated bolts.

[2)] The terms "bolts" and "nuts" are used in a general sense to designate external and internal threads respectively.

[3)] Limits and tolerances for close nuts are given in Appendix E.

[4)] For the bases of the tolerances and allowances see Appendix B.

The choice of fit for a particular purpose rests with the designer. A close class bolt would usually be assembled with a medium class nut, and a medium or free class bolt with a normal class nut, but in special circumstances different combinations of classes may be specified for mating bolts and nuts if desired.

Information about plating, as applied to the various classes of bolts and nuts, is given in Clause **6**.

5 Standard diameter — pitch series: Limits and tolerances

The basic sizes for the B.S.W. and B.S.F. series are given in Table 1 and Table 7 respectively.

Limits and tolerances for the major, effective and minor diameters for the various classes are given in Table 2 to Table 6 for the B.S.W. series and in Table 8 to Table 12 for the B.S.F. series. Limits and tolerances for close class nuts in the B.S.W. and B.S.F. series are given in Appendix E.

In these tables, the effective diameter tolerances, which are intended to include the diametral effects of pitch and angle error (see Appendix C), have been calculated from the general formula (see page 40) taking the length of engagement as being equal to the nominal diameter of the thread. In order to reduce to a minimum the number of NOT GO gauges required, the tolerances for the B.S.W. and B.S.F. series of threads, although calculated for the lengths of engagement just quoted may, however, be regarded as applicable to lengths of engagement up to fifteen pitches. The tolerances quoted for the major and minor diameters of threads belonging to the B.S.W. and B.S.F. series may be accepted for any length of engagement.

Following existing practice, no tolerance is specified for the major diameters of the nuts, but only a minimum size, which is the same as the basic major diameter. The major diameters of nuts will be controlled in practice by the major diameters of the taps or other screwing tools used to cut the threads.

Figure 3, Figure 4 and Figure 5 show, for the three recommended combinations of classes respectively, the relationship existing between the diametral tolerances for a $^1/_4$ in. B.S.W. bolt and nut. It will be noted that the nut minor diameter tolerances are such as to permit a tapping drill of ample size to be used, thus preventing binding at the root of the tap during the tapping operation. If full advantage is taken of the generous nut minor diameter tolerances, the crests of the nut threads will be flat. In special cases, though, where thin nuts are used, it may be desirable not to take full advantage of the tolerance on minor diameter. It will also be noted that the bolt major diameter tolerances are such as to permit crests which are not perfectly radiused (see Appendix D).

Formulae for calculating the tolerances for major, effective and minor diameters are given in Appendix B.

6 Plated threads

The following recommendations refer to the limits for screw threads which are plated with metals such as cadmium, nickel, tin or zinc, *where the usual thickness of plating is of the order of* 0.0002 *in.;* they do not apply to heavily plated threads.

Taking as a basis Figure 2, which shows the effective diameter tolerance zones for bolts and nuts of the various classes supplied unplated, Figure 6 shows in addition the corresponding recommended tolerance zones for bolts and nuts of nominal sizes $^3/_4$ in. and below before and after plating.

It will be noted for these sizes that plating is accommodated within the allowance in the case of the medium and free class bolts, and by adjustment of the bolt tolerance zone in the case of the close class bolts.

The interpretation of Figure 6 is as follows:—

i) Both free and medium class bolts are suitable for plating. The finished size of the screw threads *after* plating shall not exceed the basic size.

ii) Should it be necessary to plate close class bolts, again the finished size of the threads *after* plating shall not exceed the basic size. In order to avoid any undue restriction of the tolerance for screwing, the sizes of close class bolts *before* plating may be smaller than the lower limits specified in Table 2 and Table 8 by an amount not greater than 0.001 in.

iii) The sizes of finished medium class and normal class nuts, whether plated or not, shall not fall below the lower limits specified in the appropriate tables of limits and tolerances.

iv) Since the plating of medium class nuts may necessitate a reduction in the manufacturing tolerances in order that, after plating, they comply with the specified lower limits, it is strongly recommended that plated normal class nuts be used instead of medium class where plating is a requirement.

Bolts and nuts of nominal sizes above $^3/_4$ in., whether plated or not, shall comply with the limiting sizes specified in the appropriate tables with the following exception. In order to avoid any undue restriction of the tolerance for screwing, the sizes of close class bolts *before* plating may be smaller than the lower limits specified in the tables by an amount not greater than 0.001 in.

Where it is known that nuts will be plated, care should be taken that the nuts are made with minimum sizes slightly greater than basic size in order to effect satisfactory assembly after plating. Similarly, medium and free class bolts of nominal sizes above $^3/_4$ in. diameter, which are required to be plated, should be made with maximum sizes slightly less than basic size.

The above remarks apply not only to the tolerance zones for effective diameter, but equally to the tolerance zones for the major and minor diameters of plated threads. The limiting sizes of medium and free class B.S.W. and B.S.F. bolt threads before and after plating are indicated in Table 4, Table 6, Table 10 and Table 12 respectively.

Recommendations on the gauging of plated screw threads are given in an Appendix to BS 919, "*Screw gauge limits and tolerances*".

7 Stainless steel bolts

Owing to the tendency for close-fitting bolts and nuts of stainless steel to seize when tightened together, it is recommended that stainless steel bolts of nominal sizes $^3/_4$ in. and below should not be made to close class limits but rather to medium or free class limits for unplated bolts. It is recommended that stainless steel bolts of nominal sizes above $^3/_4$ in. shall have maximum and minimum limits which are 0.001 in. smaller than the values obtained from the tables.

8 Selected thread series

Recommended diameter-pitch combinations for the applications of threads of Whitworth form, for which the B.S.W. and B.S.F. diameter-pitch series are unsuitable, are given in Table 13 and Table 13A.

Two tables of preferred diameters and associated pitches are included to meet the needs of different sections of industry, some preferring to use common fractions and others decimals. Table 13 lists the fractional, and Table 13A the decimal series. It will be noted that both tables contain, above $1^1/_2$ in. diameter, the same $^1/_4$ in. and $^1/_2$ in. steps, the difference between the two tables being that in the decimal series the intermediate $^1/_8$ in. steps have been replaced by steps to the nearest $^1/_{10}$ in. dimension. This enables the same diameters to be used as are recommended in BS 1916-2[5)].

a) *Basic sizes*. The basic effective and minor diameters may be determined by subtracting from the basic major diameter the basic depth of thread and twice the basic depth of thread respectively (Columns 3 and 4, Table 14).

b) *Design sizes*.

i) *Nuts*. The design sizes of the major, effective and minor diameters for all classes are the same as the corresponding basic sizes.

ii) *Bolts*.

A. *Close class*. The design sizes are the same as the basic sizes.

B. *Medium and free classes. Basic major diameters of* $^3/_4$ *in. and below*. The design sizes are obtained from the basic sizes by subtracting the appropriate allowance given in Table 15.

Basic major diameters above $^3/_4$ *in*. The design sizes are the same as the basic sizes.

c) *Tolerances*. The tolerances on Whitworth Selected Threads for bolts and nuts of nominal sizes up to 20 in. are obtained from Table 16 to Table 20 inclusive. For nominal diameters above 20 in. the tolerances should be calculated from the data and formulae in Appendix B.

The effective diameter tolerances have been calculated from the general formula given in Appendix B, assuming a length of engagement of the mating threads equal to ten times the pitch. The tolerances so obtained may be regarded as satisfactory for all normal lengths of engagement, say five to fifteen pitches. For exceptional lengths of engagement, if these tolerances are found to be unsuitable, the effective diameter tolerance should be calculated from the basic formula in Appendix B, giving L_e its actual value.

5) BS 1916-2, "*Guide to the selection of fits*".

No tolerance is specified for the major diameter of the nut thread, as it is considered that this dimension will be controlled adequately by the crests of the taps or other cutting tools used to produce the threads.

All diametral tolerances on screw threads are applied unilaterally from the appropriate design size of the dimension, "minus" for a bolt and "plus" for a nut.

Examples illustrating the use of Table 14 to Table 20 when determining limits and tolerances of Whitworth Selected Screw Threads are given following Table 14.

Exceptional design requirements may, at times, necessitate the use of a screw thread of Whitworth form but having a diameter-pitch combination differing from those recommended in Table 13 and Table 13A and the relevant notes. It is recommended in such cases that the number of threads per inch should be chosen from the following series.

40 36 **32** 28 **26** 24 **20** 18 **16** 14 **12** 11 10 **8 6 4** threads per inch

The numbers of threads per inch in heavy type are to be regarded as preferred.

The design sizes and tolerances for such threads should be derived as stated for threads in the Selected Thread series.

9 Tolerances on effective diameter, pitch and flank angles

Errors in the pitch and flank angles of a thread virtually increase the effective diameter of a bolt and decrease the effective diameter of a nut. The minimum metal limits stated in the tables apply to the simple effective diameter (as measured along the pitch line of the thread) and the maximum metal limits apply to the effective diameter as virtually increased (for bolts) or decreased (for nuts) by the diametral equivalents of any errors present in the flank angles and in the pitch over the length of engagement (see Appendix C).

10 Designation of screw threads of Whitworth form

It is recommended that the following system should be adopted on drawings and related documents for designating the screw threads covered by the present standard.

	Designation
British Standard Whitworth series	B.S.W.
British Standard Fine series	B.S.F.

The basic major diameter of the thread and the number of threads per inch should be added to the designation. If the thread is left-hand the symbol "LH" should follow the designation.

Examples:

$^1/_4$ in. — 20 B.S.W.

$^1/_2$ in. — 16 B.S.F., LH

For screw threads of the selected diameters and pitches given in Table 13 and Table 13A, the basic major diameter and number of threads per inch should be stated, followed by the symbol "Whit. S".

Example: 1 in. — 20 Whit. S.

Screw threads of Whitworth form but not having the selected diameter-pitch combinations given in Table 13 and Table 13A should be designated as given below:—

Example: 0.67 in. — 20 Whit.

Where it is desired to designate the class of thread tolerance, one of the four terms "close", "medium", "free" or "normal" should be added in brackets, together with the word "bolt" or "nut" as appropriate.

Examples:

$^1/_4$ in. — 20 B.S.W. (close) bolt.

1 in. — 20 Whit. S. (free) bolt.

$1^1/_2$ in. — 8 B.S.F. (normal) nut.

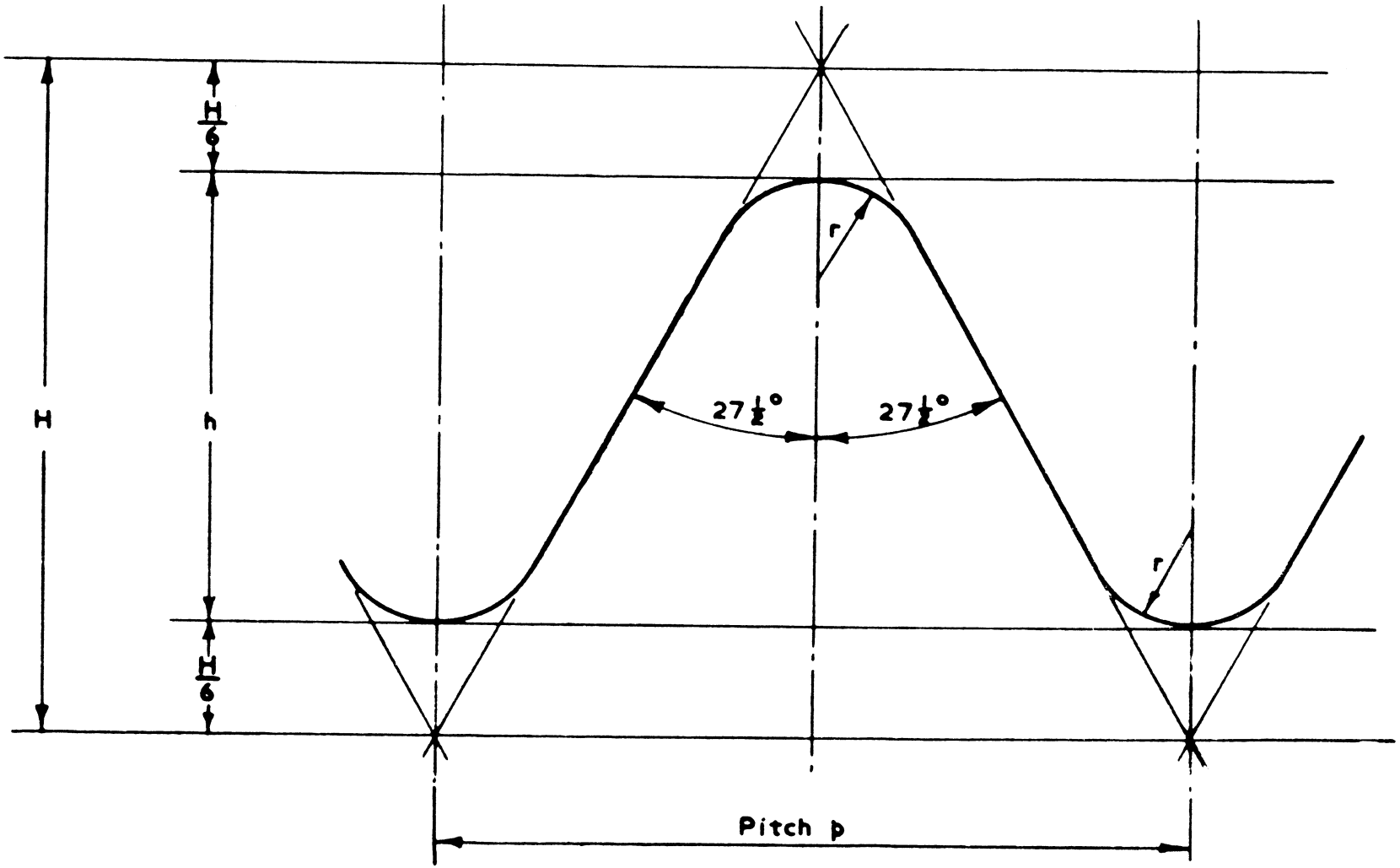
It is recommended that multiple-start Whitworth form threads should be designated as in the following example:—

2 in. 2 start, 0.2 in. lead, 0.1 in. pitch, Whit.

11 Gauges

It is recommended that the gauging system to be employed for checking screw threads of Whitworth form between the limits laid down in this standard should be that given in BS 919, "*Screw gauge limits and tolerances*".

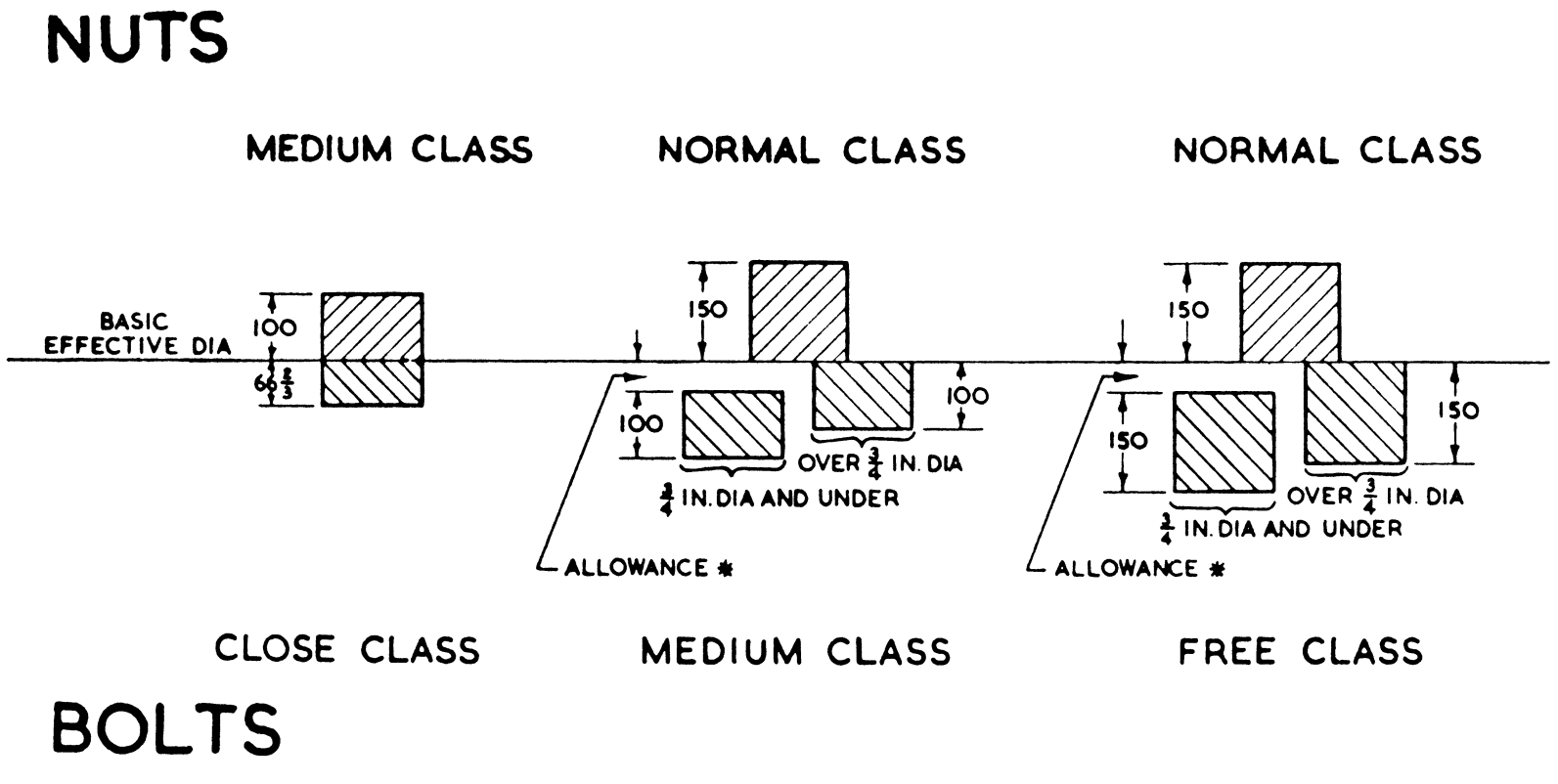
Unless otherwise stated GO ring or calliper gauges for medium or free class bolts of nominal sizes $^{3}/_{4}$ in. and below will be supplied made to the limits for unplated bolts.



$H = 0{\cdot}960491\ p$ $\quad \frac{H}{6} = 0{\cdot}160082\ p$

$h = \frac{2}{3}H = 0{\cdot}640327\ p$ $\quad r = 0{\cdot}137329\ p$

Figure 1 — Basic form of Whitworth thread



NOTE 1 The Medium Class bolt effective diameter tolerance is shown as 100 units and the other values are expressed as a percentage of this tolerance. The formula for effective diameter tolerance is given in Appendix B.

NOTE 2 See Appendix E for Close Class nuts for special needs.

* See Clause 4.

Figure 2 — Effective diameter tolerance zones of recommended combinations of classes of bolts and nuts having Whitworth screw threads

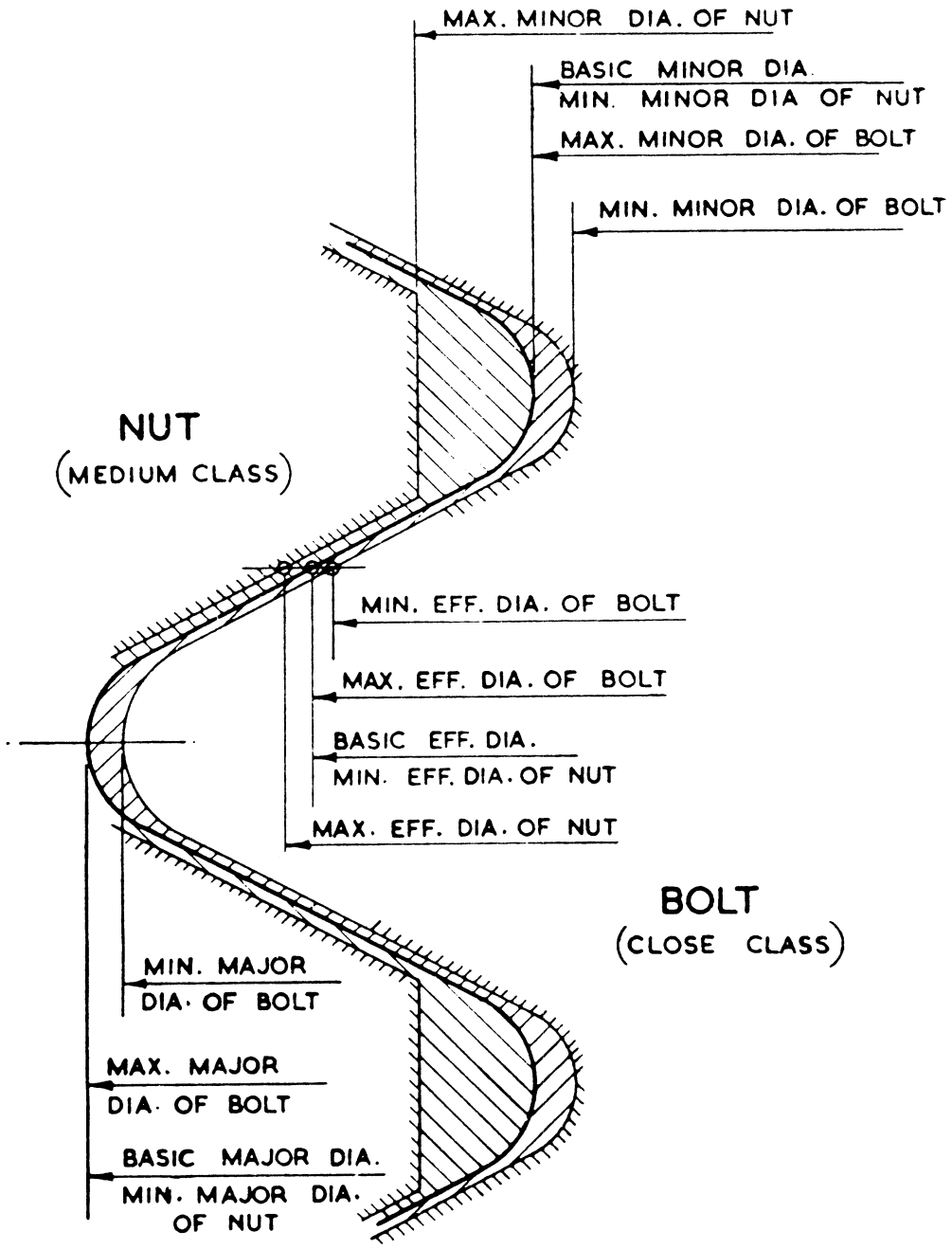
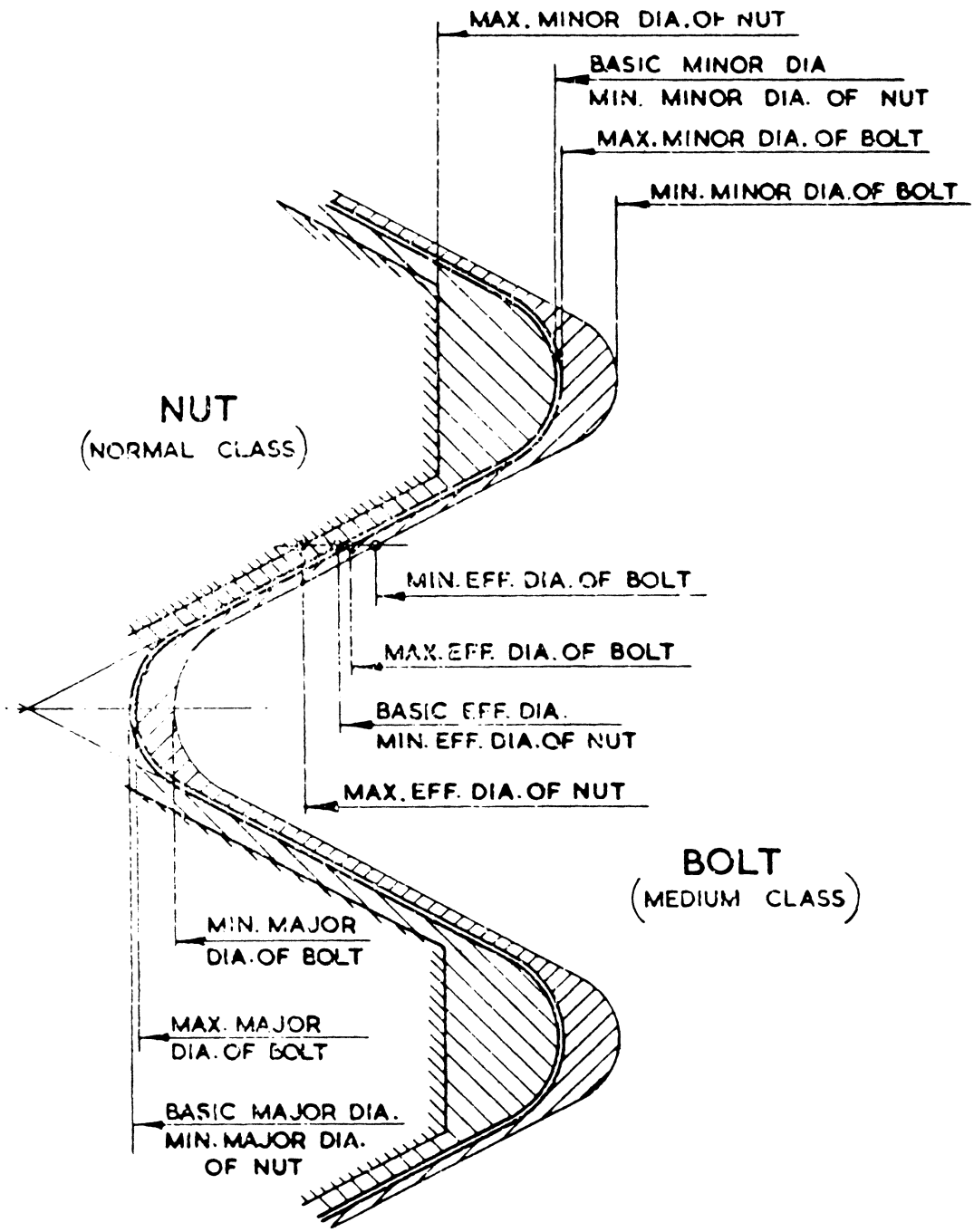
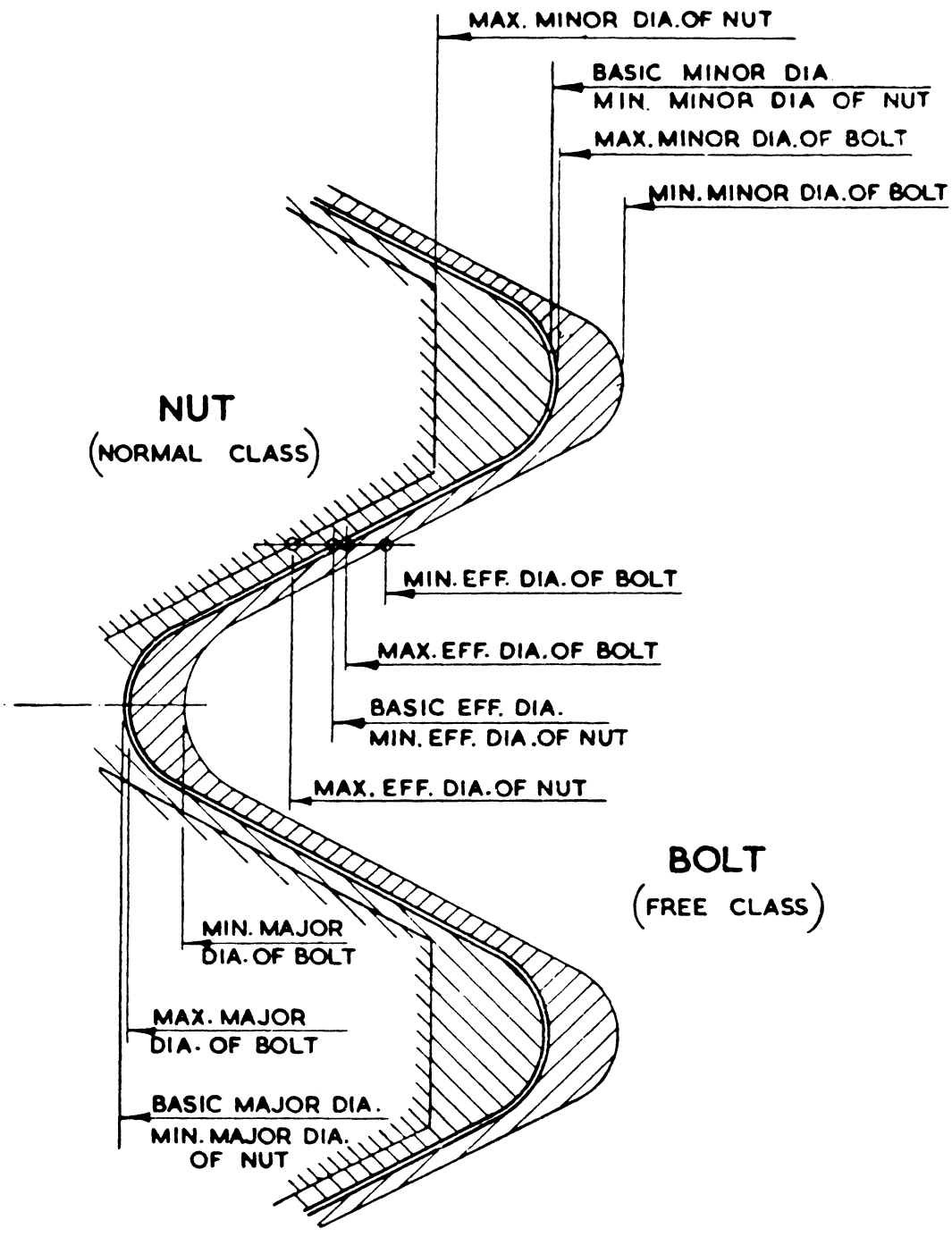


Figure 3 — Tolerance zones for close class bolt and medium class nut $^{1}/_{4}$ in. B.S.W. (20 t.p.i.) illustrated



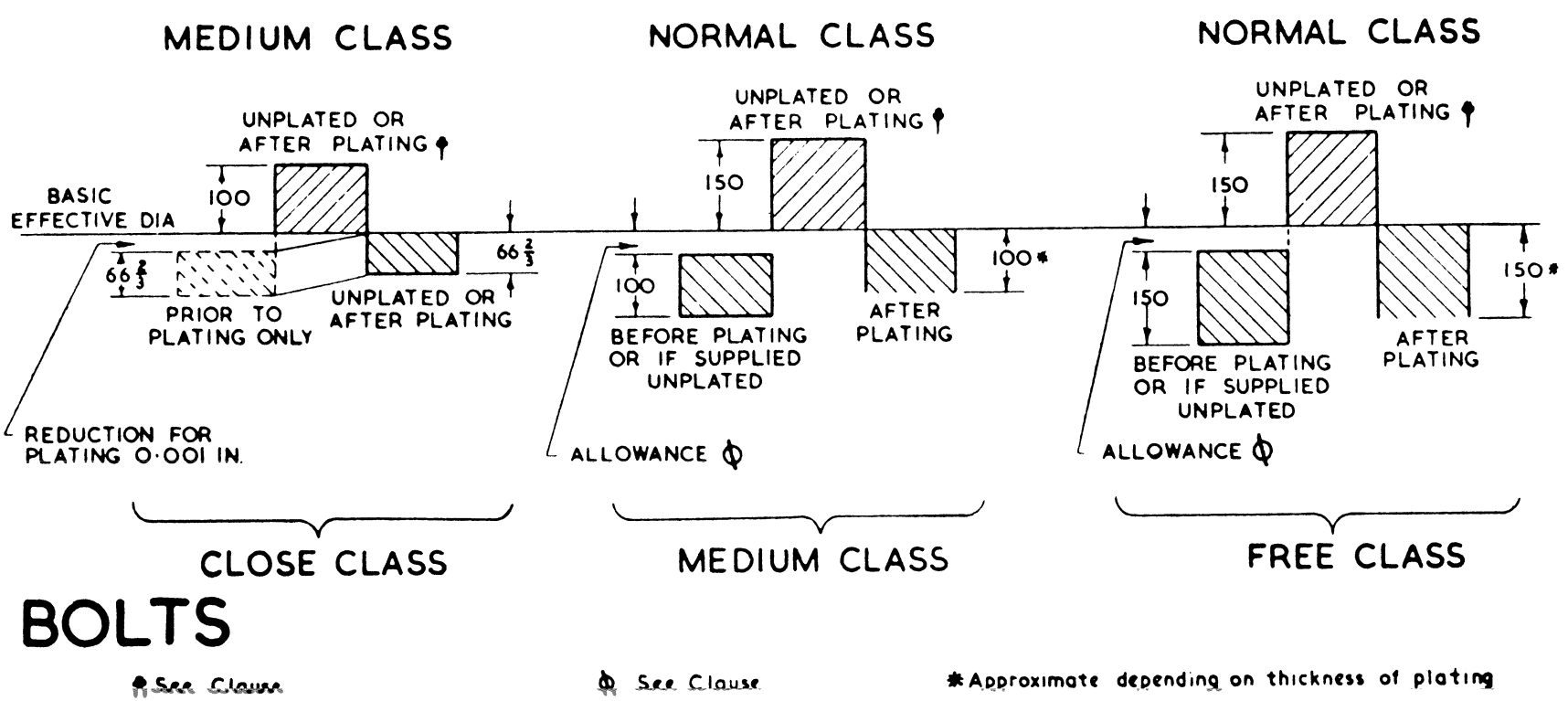
NOTE The maximum bolt dimensions refer to unplated bolts only.

Figure 4 — Tolerance zones for medium class bolt with allowance and normal class nut. $^1/_4$ in. B.S.W. (20 t.p.i.) illustrated



NOTE The maximum bolt dimensions refer to unplated bolts only.

Figure 5 — Tolerance zones for free class bolt with allowance and normal class nut. $^1/_4$ in. B.S.W. (20 t.p.i.) illustrated



NOTE 1 Bolt Medium Class effective diameter tolerance is shown as 100 units.
NOTE 2 See Appendix E for Close Class nuts for special needs.

Figure 6 — Effective diameter tolerance zones for Whitworth bolts and nuts, unplated or before plating, and after plating (cf. Figure 2) of sizes $^{3}/_{4}$ in. nominal size and smaller

Coarse thread series, B.S.W.

Table 1 — Basic sizes

1	2	3	4	5	6	7	8
Nominal size	**Number of threads per inch**	**Pitch**	**Depth of thread**	**Major diameter**	**Effective diameter**	**Minor diameter**	**Cross sectional area at bottom of thread**
in.		in.	in.	in.	in.	in.	sq. in.
1/8 [ab]	40	0.02500	0.0160	0.1250	0.1090	0.0930	0.0068
3/16	24	0.04167	0.0267	0.1875	0.1608	0.1341	0.0141
1/4	20	0.05000	0.0320	0.2500	0.2180	0.1860	0.0272
5/16	18	0.05556	0.0356	0.3125	0.2769	0.2413	0.0457
3/8	16	0.06250	0.0400	0.3750	0.3350	0.2950	0.0683
7/16	14	0.07143	0.0457	0.4375	0.3918	0.3461	0.0941
1/2	12	0.08333	0.0534	0.5000	0.4466	0.3932	0.1214
9/16 [a]	12	0.08333	0.0534	0.5625	0.5091	0.4557	0.1631
5/8	11	0.09091	0.0582	0.6250	0.5668	0.5086	0.2032
11/16 [a]	11	0.09091	0.0582	0.6875	0.6293	0.5711	0.2562
3/4	10	0.10000	0.0640	0.7500	0.6860	0.6220	0.3039
7/8	9	0.11111	0.0711	0.8750	0.8039	0.7328	0.4218
1	8	0.12500	0.0800	1.0000	0.9200	0.8400	0.5542
1 1/8	7	0.14286	0.0915	1.1250	1.0335	0.9420	0.6969
1 1/4	7	0.14286	0.0915	1.2500	1.1585	1.0670	0.8942
1 1/2	6	0.16667	0.1067	1.5000	1.3933	1.2866	1.3000
1 3/4	5	0.20000	0.1281	1.7500	1.6219	1.4938	1.7530
2	4.5	0.22222	0.1423	2.0000	1.8577	1.7154	2.3110
2 1/4	4	0.25000	0.1601	2.2500	2.0899	1.9298	2.9250
2 1/2	4	0.25000	0.1601	2.5000	2.3399	2.1798	3.7320
2 3/4	3.5	0.28571	0.1830	2.7500	2.5670	2.3840	4.4640
3	3.5	0.28571	0.1830	3.0000	2.8170	2.6340	5.4490
3 1/4 [a]	3.25	0.30769	0.1970	3.2500	3.0530	2.8560	6.4060
3 1/2	3.25	0.30769	0.1970	3.5000	3.3030	3.1060	7.5770
3 3/4 [a]	3	0.33333	0.2134	3.7500	3.5366	3.3232	8.6740
4	3	0.33333	0.2134	4.0000	3.7866	3.5732	10.0300
4 1/2	2.875	0.34783	0.2227	4.5000	4.2773	4.0546	12.9100
5	2.75	0.36364	0.2328	5.0000	4.7672	4.5344	16.1500
5 1/2	2.625	0.38095	0.2439	5.5000	5.2561	5.0122	19.7300
6	2.5	0.40000	0.2561	6.0000	5.7439	5.4878	23.6500

[a] To be dispensed with wherever possible.

[b] Dimensionally, the 1/8 in. × 40 t.p.i. thread belongs more appropriately to the B.S.F. series, but it has for so long been associated with the B.S.W. series that it is now included herein.

Table 2 — Bolts — Close class

Limits and Tolerances

1	2	3	4	5	6	7	8	9	10	11
Nominal size	Number of threads per in.	Major diameter			Effective diameter			Minor diameter		
		Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.
1/8 [a]	40	0.1250	0.0035	0.1215	0.1090	0.0019	0.1071	0.0930	0.0040	0.0890
3/16	24	0.1875	0.0043	0.1832	0.1608	0.0023	0.1585	0.1341	0.0050	0.1291
1/4	20	0.2500	0.0048	0.2452	0.2180	0.0026	0.2154	0.1860	0.0055	0.1805
5/16	18	0.3125	0.0052	0.3073	0.2769	0.0028	0.2741	0.2413	0.0059	0.2354
3/8	16	0.3750	0.0055	0.3695	0.3350	0.0030	0.3320	0.2950	0.0062	0.2888
7/16	14	0.4375	0.0059	0.4316	0.3918	0.0032	0.3886	0.3461	0.0067	0.3394
1/2	12	0.5000	0.0063	0.4937	0.4466	0.0034	0.4432	0.3932	0.0072	0.3860
9/16 [a]	12	0.5625	0.0065	0.5560	0.5091	0.0036	0.5055	0.4557	0.0074	0.4483
5/8	11	0.6250	0.0067	0.6183	0.5668	0.0037	0.5631	0.5086	0.0076	0.5010
11/16 [a]	11	0.6875	0.0068	0.6807	0.6293	0.0038	0.6255	0.5711	0.0077	0.5634
3/4	10	0.7500	0.0072	0.7428	0.6860	0.0040	0.6820	0.6220	0.0081	0.6139
7/8	9	0.8750	0.0076	0.8764	0.8039	0.0043	0.7996	0.7328	0.0086	0.7242
1	8	1.0000	0.0080	0.9920	0.9200	0.0045	0.9155	0.8400	0.0091	0.8309
1 1/8	7	1.1250	0.0086	1.1164	1.0335	0.0048	1.0287	0.9420	0.0097	0.9323
1 1/4	7	1.2500	0.0087	1.2413	1.1585	0.0049	1.1536	1.0670	0.0098	1.0572
1 1/2	6	1.5000	0.0094	1.4906	1.3933	0.0053	1.3880	1.2866	0.0106	1.2760
1 3/4	5	1.7500	0.0102	1.7398	1.6219	0.0057	1.6162	1.4938	0.0115	1.4823
2	4.5	2.0000	0.0108	1.9892	1.8577	0.0061	1.8516	1.7154	0.0122	1.7032
2 1/4	4	2.2500	0.0114	2.2386	2.0899	0.0064	2.0835	1.9298	0.0129	1.9169
2 1/2	4	2.5000	0.0116	2.4884	2.3399	0.0066	2.3333	2.1798	0.0131	2.1667
2 3/4	3.5	2.7500	0.0123	2.7377	2.5670	0.0070	2.5600	2.3840	0.0139	2.3701
3	3.5	3.0000	0.0125	2.9875	2.8170	0.0072	2.8098	2.6340	0.0141	2.6199
3 1/4 [a]	3.25	3.2500	0.0130	3.2370	3.0530	0.0074	3.0456	2.8560	0.0146	2.8414
3 1/2	3.25	3.5000	0.0132	3.4868	3.3030	0.0076	3.2954	3.1060	0.0148	3.0912
3 3/4 [a]	3	3.7500	0.0136	3.7364	3.5366	0.0079	3.5287	3.3232	0.0154	3.3078
4	3	4.0000	0.0138	3.9862	3.7866	0.0080	3.7786	3.5732	0.0155	3.5577
4 1/2	2.875	4.5000	0.0143	4.4857	4.2773	0.0084	4.2689	4.0546	0.0161	4.0385
5	2.75	5.0000	0.0148	4.9852	4.7672	0.0088	4.7584	4.5344	0.0166	4.5178
5 1/2	2.625	5.5000	0.0153	5.4847	5.2561	0.0091	5.2470	5.0122	0.0171	4.9951
6	2.5	6.0000	0.0158	5.9842	5.7439	0.0094	5.7345	5.4878	0.0177	5.4701

[a] To be dispensed with wherever possible.

Table 3 — Nuts — Medium class

Limits and Tolerances

1	2	3	4	5	6	7	8	9
Nominal size	Number of threads per inch	Major diameter	Effective diameter			Minor diameter		
		Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.
1/8 [a]	40	0.1250	0.1119	0.0029	0.1090	0.1020	0.0090	0.0930
3/16	24	0.1875	0.1643	0.0035	0.1608	0.1474	0.0133	0.1341
1/4	20	0.2500	0.2219	0.0039	0.2180	0.2030	0.0170	0.1860
5/16	18	0.3125	0.2811	0.0042	0.2769	0.2594	0.0181	0.2413
3/8	16	0.3750	0.3395	0.0045	0.3350	0.3145	0.0195	0.2950
7/16	14	0.4375	0.3966	0.0048	0.3918	0.3674	0.0213	0.3461
1/2	12	0.5000	0.4518	0.0052	0.4466	0.4169	0.0237	0.3932
9/16 [a]	12	0.5625	0.5144	0.0053	0.5091	0.4794	0.0237	0.4557
5/8	11	0.6250	0.5724	0.0056	0.5668	0.5338	0.0252	0.5086
11/16 [a]	11	0.6875	0.6351	0.0058	0.6293	0.5963	0.0252	0.5711
3/4	10	0.7500	0.6920	0.0060	0.6860	0.6490	0.0270	0.6220
7/8	9	0.8750	0.8103	0.0064	0.8039	0.7620	0.0292	0.7328
1	8	1.0000	0.9268	0.0068	0.9200	0.8720	0.0320	0.8400
1 1/8	7	1.1250	1.0407	0.0072	1.0335	0.9776	0.0356	0.9420
1 1/4	7	1.2500	1.1659	0.0074	1.1585	1.1026	0.0356	1.0670
1 1/2	6	1.5000	1.4013	0.0080	1.3933	1.3269	0.0403	1.2866
1 3/4	5	1.7500	1.6305	0.0086	1.6219	1.5408	0.0470	1.4938
2	4.5	2.0000	1.8668	0.0091	1.8577	1.7668	0.0514	1.7154
2 1/4	4	2.2500	2.0995	0.0096	2.0899	1.9868	0.0570	1.9298
2 1/2	4	2.5000	2.3499	0.0100	2.3399	2.2368	0.0570	2.1798
2 3/4	3.5	2.7500	2.5774	0.0104	2.5670	2.4481	0.0641	2.3840
3	3.5	3.0000	2.8278	0.0108	2.8170	2.6981	0.0641	2.6340
3 1/4 [a]	3.25	3.2500	3.0641	0.0111	3.0530	2.9245	0.0685	2.8560
3 1/2	3.25	3.5000	3.3144	0.0114	3.3030	3.1745	0.0685	3.1060
3 3/4 [a]	3	3.7500	3.5484	0.0118	3.5366	3.3969	0.0737	3.3232
4	3	4.0000	3.7987	0.0121	3.7866	3.6469	0.0737	3.5732
4 1/2	2.875	4.5000	4.2899	0.0126	4.2773	4.1312	0.0766	4.0546
5	2.75	5.0000	4.7803	0.0131	4.7672	4.6141	0.0797	4.5344
5 1/2	2.625	5.5000	5.2698	0.0137	5.2561	5.0954	0.0832	5.0122
6	2.5	6.0000	5.7580	0.0141	5.7439	5.5748	0.0870	5.4878

[a] To be dispensed with wherever possible.

Table 4 — Bolts — Medium class

Limits and Tolerances

a) **Nominal sizes up to and including 3/4 in.**

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nominal size	Number of threads per inch	Major diameter				Effective diameter				Minor diameter			
		Unplated or before plating			After plating	Unplated or before plating			After plating	Unplated or before plating			After plating
		Max.	Tol.	Min.	Max.	Max.	Tol.	Min.	Max.	Max.	Tol.	Min.	Max.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1/8 [a]	40	0.1238	0.0045	0.1193	0.1250	0.1078	0.0029	0.1049	0.1090	0.0918	0.0061	0.0857	0.0930
3/16	24	0.1863	0.0055	0.1808	0.1875	0.1596	0.0035	0.1561	0.1608	0.1329	0.0076	0.1253	0.1341
1/4	20	0.2488	0.0061	0.2427	0.2500	0.2168	0.0039	0.2129	0.2180	0.1848	0.0084	0.1764	0.1860
5/16	18	0.3112	0.0066	0.3046	0.3125	0.2756	0.0042	0.2714	0.2769	0.2400	0.0089	0.2311	0.2413
3/8	16	0.3736	0.0070	0.3666	0.3750	0.3336	0.0045	0.3291	0.3350	0.2936	0.0095	0.2841	0.2950
7/16	14	0.4360	0.0075	0.4285	0.4375	0.3903	0.0048	0.3855	0.3918	0.3446	0.0101	0.3345	0.3461
1/2	12	0.4985	0.0081	0.4904	0.5000	0.4451	0.0052	0.4399	0.4466	0.3917	0.0110	0.3807	0.3932
9/16 [a]	12	0.5609	0.0082	0.5527	0.5625	0.5075	0.0053	0.5022	0.5091	0.4541	0.0111	0.4430	0.4557
5/8	11	0.6233	0.0086	0.6147	0.6250	0.5651	0.0056	0.5595	0.5668	0.5069	0.0116	0.4953	0.5086
11/16 [a]	11	0.6858	0.0088	0.6770	0.6875	0.6276	0.0058	0.6218	0.6293	0.5694	0.0118	0.5576	0.5711
3/4	10	0.7482	0.0092	0.7390	0.7500	0.6842	0.0060	0.6782	0.6860	0.6202	0.0123	0.6079	0.6220

b) **Nominal sizes above 3/4 in.**

1	2	3	4	5	6	7	8	9	10	11
Nominal size	Number of threads per in.	Major diameter			Effective diameter			Minor diameter		
		Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.
7/8	9	0.8750	0.0097	0.8653	0.8039	0.0064	0.7975	0.7328	0.0131	0.7197
1	8	1.0000	0.0103	0.9897	0.9200	0.0068	0.9132	0.8400	0.0139	0.8261
1 1/8	7	1.1250	0.0110	1.1140	1.0335	0.0072	1.0263	0.9420	0.0148	0.9272
1 1/4	7	1.2500	0.0112	1.2388	1.1585	0.0074	1.1511	1.0670	0.0150	1.0520
1 1/2	6	1.5000	0.0121	1.4879	1.3933	0.0080	1.3853	1.2866	0.0162	1.2704
1 3/4	5	1.7500	0.0131	1.7369	1.6219	0.0086	1.6133	1.4938	0.0175	1.4763
2	4.5	2.0000	0.0138	1.9862	1.8577	0.0091	1.8486	1.7154	0.0185	1.6969
2 1/4	4	2.2500	0.0146	2.2354	2.0899	0.0096	2.0803	1.9298	0.0196	1.9102
2 1/2	4	2.5000	0.0150	2.4850	2.3399	0.0100	2.3299	2.1798	0.0200	2.1598
2 3/4	3.5	2.7500	0.0157	2.7343	2.5670	0.0104	2.5566	2.3840	0.0211	2.3629
3	3.5	3.0000	0.0161	2.9839	2.8170	0.0108	2.8062	2.6340	0.0215	2.6125
3 1/4 [a]	3.25	3.2500	0.0167	3.2333	3.0530	0.0111	3.0419	2.8560	0.0222	2.8338
3 1/2	3.25	3.5000	0.0170	3.4830	3.3030	0.0114	3.2916	3.1060	0.0225	3.0835
3 3/4 [a]	3	3.7500	0.0176	3.7324	3.5366	0.0118	3.5248	3.3232	0.0234	3.2998
4	3	4.0000	0.0178	3.9822	3.7866	0.0121	3.7745	3.5732	0.0236	3.5496
4 1/2	2.875	4.5000	0.0185	4.4815	4.2773	0.0126	4.2647	4.0546	0.0244	4.0302
5	2.75	5.0000	0.0192	4.9808	4.7672	0.0131	4.7541	4.5344	0.0252	4.5092
5 1/2	2.625	5.5000	0.0198	5.4802	5.2561	0.0137	5.2424	5.0122	0.0260	4.9862
6	2.5	6.0000	0.0205	5.9795	5.7439	0.0141	5.7298	5.4878	0.0268	5.4610

[a] To be dispensed with wherever possible.

Table 5 — Nuts — Normal class

Limits and Tolerances

1	2	3	4	5	6	7	8	9
Nominal size	Number of threads per inch	Major diameter	Effective diameter			Minor diameter		
		Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.
1/8 [a]	40	0.1250	0.1133	0.0043	0.1090	0.1020	0.0090	0.0930
3/16	24	0.1875	0.1660	0.0052	0.1608	0.1474	0.0133	0.1341
1/4	20	0.2500	0.2238	0.0058	0.2180	0.2030	0.0170	0.1860
5/16	18	0.3125	0.2832	0.0063	0.2769	0.2594	0.0181	0.2413
3/8	16	0.3750	0.3418	0.0068	0.3350	0.3145	0.0195	0.2950
7/16	14	0.4375	0.3991	0.0073	0.3918	0.3674	0.0213	0.3461
1/2	12	0.5000	0.4543	0.0077	0.4466	0.4169	0.0237	0.3932
9/16 [a]	12	0.5625	0.5171	0.0080	0.5091	0.4794	0.0237	0.4557
5/8	11	0.6250	0.5752	0.0084	0.5668	0.5338	0.0252	0.5086
11/16 [a]	11	0.6875	0.6379	0.0086	0.6293	0.5963	0.0252	0.5711
3/4	10	0.7500	0.6950	0.0090	0.6860	0.6490	0.0270	0.6220
7/8	9	0.8750	0.8135	0.0096	0.8039	0.7620	0.0292	0.7328
1	8	1.0000	0.9302	0.0102	0.9200	0.8720	0.0320	0.8400
1 1/8	7	1.1250	1.0442	0.0107	1.0335	0.9776	0.0356	0.9420
1 1/4	7	1.2500	1.1696	0.0111	1.1585	1.1026	0.0356	1.0670
1 1/2	6	1.5000	1.4053	0.0120	1.3933	1.3269	0.0403	1.2866
1 3/4	5	1.7500	1.6348	0.0129	1.6219	1.5408	0.0470	1.4938
2	4.5	2.0000	1.8714	0.0137	1.8577	1.7668	0.0514	1.7154
2 1/4	4	2.2500	2.1043	0.0144	2.0899	1.9868	0.0570	1.9298
2 1/2	4	2.5000	2.3548	0.0149	2.3399	2.2368	0.0570	2.1798
2 3/4	3.5	2.7500	2.5827	0.0157	2.5670	2.4481	0.0641	2.3840
3	3.5	3.0000	2.8331	0.0161	2.8170	2.6981	0.0641	2.6340
3 1/4 [a]	3.25	3.2500	3.0697	0.0167	3.0530	2.9245	0.0685	2.8560
3 1/2	3.25	3.5000	3.3201	0.0171	3.3030	3.1745	0.0685	3.1060
3 3/4 [a]	3	3.7500	3.5543	0.0177	3.5366	3.3969	0.0737	3.3232
4	3	4.0000	3.8047	0.0181	3.7866	3.6469	0.0737	3.5732
4 1/2	2.875	4.5000	4.2962	0.0189	4.2773	4.1312	0.0766	4.0546
5	2.75	5.0000	4.7869	0.0197	4.7672	4.6141	0.0797	4.5344
5 1/2	2.625	5.5000	5.2766	0.0205	5.2561	5.0954	0.0832	5.0122
6	2.5	6.0000	5.7651	0.0212	5.7439	5.5748	0.0870	5.4878

[a] To be dispensed with wherever possible.

Table 6 — Bolts — Free class

Limits and Tolerances

a) **Nominal sizes up to and including $^3/_4$ in.**

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nominal size	Number of threads per inch	Major diameter				Effective diameter				Minor diameter			
		Unplated or before plating			After plating	Unplated or before plating			After plating	Unplated or before plating			After plating
		Max.	Tol.	Min.	Max.	Max.	Tol.	Min.	Max.	Max.	Tol.	Min.	Max.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
$^1/_8$ [a]	40	0.1238	0.0059	0.1179	0.1250	0.1078	0.0043	0.1035	0.1090	0.0918	0.0075	0.0843	0.0930
$^3/_{16}$	24	0.1863	0.0072	0.1791	0.1875	0.1596	0.0052	0.1544	0.1608	0.1329	0.0093	0.1236	0.1341
$^1/_4$	20	0.2488	0.0080	0.2408	0.2500	0.2168	0.0058	0.2110	0.2180	0.1848	0.0103	0.1745	0.1860
$^5/_{16}$	18	0.3112	0.0087	0.3025	0.3125	0.2756	0.0063	0.2693	0.2769	0.2400	0.0110	0.2290	0.2413
$^3/_8$	16	0.3736	0.0093	0.3643	0.3750	0.3336	0.0068	0.3268	0.3350	0.2936	0.0118	0.2818	0.2950
$^7/_{16}$	14	0.4360	0.0100	0.4260	0.4375	0.3903	0.0073	0.3830	0.3918	0.3446	0.0126	0.3320	0.3461
$^1/_2$	12	0.4985	0.0106	0.4879	0.5000	0.4451	0.0077	0.4374	0.4466	0.3917	0.0135	0.3782	0.3932
$^9/_{16}$ [a]	12	0.5609	0.0109	0.5500	0.5625	0.5075	0.0080	0.4995	0.5091	0.4541	0.0138	0.4403	0.4557
$^5/_8$	11	0.6233	0.0114	0.6119	0.6250	0.5651	0.0084	0.5567	0.5668	0.5069	0.0144	0.4925	0.5086
$^{11}/_{16}$ [a]	11	0.6858	0.0116	0.6742	0.6875	0.6276	0.0086	0.6190	0.6293	0.5694	0.0146	0.5548	0.5711
$^3/_4$	10	0.7482	0.0122	0.7360	0.7500	0.6842	0.0090	0.6752	0.6860	0.6202	0.0153	0.6049	0.6220

b) **Nominal sizes above $^3/_4$ in.**

1	2	3	4	5	6	7	8	9	10	11
Nominal size	Number of threads per in.	Major diameter			Effective diameter			Minor diameter		
		Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.
$^7/_8$	9	0.8750	0.0129	0.8621	0.8039	0.0096	0.7943	0.7328	0.0163	0.7165
1	8	1.0000	0.0137	0.9863	0.9200	0.0102	0.9098	0.8400	0.0173	0.8227
$1^1/_8$	7	1.1250	0.0145	1.1105	1.0335	0.0107	1.0228	0.9420	0.0183	0.9237
$1^1/_4$	7	1.2500	0.0149	1.2351	1.1585	0.0111	1.1474	1.0670	0.0187	1.0483
$1^1/_2$	6	1.5000	0.0161	1.4839	1.3933	0.0120	1.3813	1.2866	0.0202	1.2664
$1^3/_4$	5	1.7500	0.0174	1.7326	1.6219	0.0129	1.6090	1.4938	0.0218	1.4720
2	4.5	2.0000	0.0184	1.9816	1.8577	0.0137	1.8440	1.7154	0.0231	1.6923
$2^1/_4$	4	2.2500	0.0194	2.2306	2.0899	0.0144	2.0755	1.9298	0.0244	1.9054
$2^1/_2$	4	2.5000	0.0199	2.4801	2.3399	0.0149	2.3250	2.1798	0.0249	2.1549
$2^3/_4$	3.5	2.7500	0.0210	2.7290	2.5670	0.0157	2.5513	2.3840	0.0264	2.3576
3	3.5	3.0000	0.0214	2.9786	2.8170	0.0161	2.8009	2.6340	0.0268	2.6072
$3^1/_4$ [a]	3.25	3.2500	0.0223	3.2277	3.0530	0.0167	3.0363	2.8560	0.0278	2.8282
$3^1/_2$	3.25	3.5000	0.0227	3.4773	3.3030	0.0171	3.2859	3.1060	0.0282	3.0778
$3^3/_4$ [a]	3	3.7500	0.0235	3.7265	3.5366	0.0177	3.5189	3.3232	0.0293	3.2939
4	3	4.0000	0.0239	3.9761	3.7866	0.0181	3.7685	3.5732	0.0296	3.5436
$4^1/_2$	2.875	4.5000	0.0248	4.4752	4.2773	0.0189	4.2584	4.0546	0.0307	4.0239
5	2.75	5.0000	0.0257	4.9743	4.7672	0.0197	4.7475	4.5344	0.0318	4.5026
$5^1/_2$	2.625	5.5000	0.0267	5.4733	5.2561	0.0205	5.2356	5.0122	0.0328	4.9794
6	2.5	6.0000	0.0275	5.9725	5.7439	0.0212	5.7227	5.4878	0.0339	5.4539

[a] To be dispensed with wherever possible.

Fine thread series, B.S.F.

Table 7 — Basic sizes

1	2	3	4	5	6	7	8
Nominal size	**Number of threads per inch**	**Pitch**	**Depth of thread**	**Major diameter**	**Effective diameter**	**Minor diameter**	**Cross sectional area at bottom of thread**
in.		in.	in.	in.	in.	in.	sq. in.
3/16 [ab]	32	0.03125	0.0200	0.1875	0.1675	0.1475	0.0171
7/32 [a]	28	0.03571	0.0229	0.2188	0.1959	0.1730	0.0235
1/4	26	0.03846	0.0246	0.2500	0.2254	0.2008	0.0317
9/32 [a]	26	0.03846	0.0246	0.2812	0.2566	0.2320	0.0423
5/16	22	0.04545	0.0291	0.3125	0.2834	0.2543	0.0508
3/8	20	0.05000	0.0320	0.3750	0.3430	0.3110	0.0760
7/16	18	0.05556	0.0356	0.4375	0.4019	0.3663	0.1054
1/2	16	0.06250	0.0400	0.5000	0.4600	0.4200	0.1385
9/16	16	0.06250	0.0400	0.5625	0.5225	0.4825	0.1828
5/8	14	0.07143	0.0457	0.6250	0.5793	0.5336	0.2236
11/16 [a]	14	0.07143	0.0457	0.6875	0.6418	0.5961	0.2791
3/4	12	0.08333	0.0534	0.7500	0.6966	0.6432	0.3249
7/8	11	0.09091	0.0582	0.8750	0.8168	0.7586	0.4520
1	10	0.10000	0.0640	1.0000	0.9360	0.8720	0.5972
1 1/8	9	0.11111	0.0711	1.1250	1.0539	0.9828	0.7586
1 1/4	9	0.11111	0.0711	1.2500	1.1789	1.1078	0.9639
1 3/8 [a]	8	0.12500	0.0800	1.3750	1.2950	1.2150	1.1590
1 1/2	8	0.12500	0.0800	1.5000	1.4200	1.3400	1.4100
1 5/8 [a]	8	0.12500	0.0800	1.6250	1.5450	1.4650	1.6860
1 3/4	7	0.14286	0.0915	1.7500	1.6585	1.5670	1.9280
2	7	0.14286	0.0915	2.0000	1.9085	1.8170	2.5930
2 1/4	6	0.16667	0.1067	2.2500	2.1433	2.0366	3.2580
2 1/2	6	0.16667	0.1067	2.5000	2.3933	2.2866	4.1060
2 3/4	6	0.16667	0.1067	2.7500	2.6433	2.5366	5.0540
3	5	0.20000	0.1281	3.0000	2.8719	2.7458	5.9130
3 1/4	5	0.20000	0.1281	3.2500	3.1219	2.9938	7.0390
3 1/2	4.5	0.22222	0.1423	3.5000	3.3577	3.2154	8.1200
3 3/4	4.5	0.22222	0.1423	3.7500	3.6077	3.4654	9.4320
4	4.5	0.22222	0.1423	4.0000	3.8577	3.7154	10.8400
4 1/4	4	0.25000	0.1601	4.2500	4.0899	3.9298	12.1300

NOTE It is recommended that for larger diameters in this series four threads per inch be used.

[a] To be dispensed with wherever possible.

[b] The use of 2 B.A. threads is recommended in place of 3/16 in. B.S.F.

Table 8 — Bolts — Close class

Limits and Tolerances

1	2	3	4	5	6	7	8	9	10	11
Nominal size	Number of threads per in.	Major diameter			Effective diameter			Minor diameter		
		Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.
3/16 ab	32	0.1875	0.0040	0.1835	0.1675	0.0022	0.1653	0.1475	0.0045	0.1430
7/32 a	28	0.2188	0.0043	0.2145	0.1959	0.0024	0.1935	0.1730	0.0049	0.1681
1/4	26	0.2500	0.0045	0.2455	0.2254	0.0025	0.2229	0.2008	0.0050	0.1958
9/32 a	26	0.2812	0.0046	0.2766	0.2566	0.0026	0.2540	0.2320	0.0051	0.2269
5/16	22	0.3125	0.0048	0.3077	0.2834	0.0027	0.2807	0.2543	0.0055	0.2488
3/8	20	0.3750	0.0051	0.3699	0.3430	0.0029	0.3401	0.3110	0.0058	0.3052
7/16	18	0.4375	0.0055	0.4320	0.4019	0.0031	0.3988	0.3663	0.0062	0.3601
1/2	16	0.5000	0.0058	0.4942	0.4600	0.0033	0.4567	0.4200	0.0065	0.4135
9/16	16	0.5625	0.0059	0.5566	0.5225	0.0034	0.5191	0.4825	0.0066	0.4759
5/8	14	0.6250	0.0063	0.6187	0.5793	0.0036	0.5757	0.5336	0.0071	0.5265
11/16 a	14	0.6875	0.0064	0.6811	0.6418	0.0037	0.6381	0.5961	0.0072	0.5889
3/4	12	0.7500	0.0068	0.7432	0.6966	0.0039	0.6927	0.6432	0.0077	0.6355
7/8	11	0.8750	0.0072	0.8678	0.8168	0.0042	0.8126	0.7586	0.0081	0.7505
1	10	1.0000	0.0076	0.9924	0.9360	0.0044	0.9316	0.8720	0.0085	0.8635
1 1/8	9	1.1250	0.0079	1.1171	1.0539	0.0046	1.0493	0.9828	0.0089	0.9739
1 1/4	9	1.2500	0.0081	1.2419	1.1789	0.0048	1.1741	1.1078	0.0091	1.0987
1 3/8 a	8	1.3750	0.0085	1.3665	1.2950	0.0050	1.2900	1.2150	0.0096	1.2054
1 1/2	8	1.5000	0.0087	1.4913	1.4200	0.0052	1.4148	1.3400	0.0098	1.3302
1 5/8 a	8	1.6250	0.0088	1.6162	1.5450	0.0053	1.5397	1.4650	0.0099	1.4551
1 3/4	7	1.7500	0.0093	1.7407	1.6585	0.0055	1.6530	1.5670	0.0104	1.5566
2	7	2.0000	0.0095	1.9905	1.9085	0.0058	1.9027	1.8170	0.0107	1.8063
2 1/4	6	2.2500	0.0102	2.2398	2.1433	0.0061	2.1372	2.0366	0.0114	2.0252
2 1/2	6	2.5000	0.0104	2.4896	2.3933	0.0063	2.3870	2.2866	0.0116	2.2750
2 3/4	6	2.7500	0.0106	2.7394	2.6433	0.0065	2.6368	2.5366	0.0119	2.5247
3	5	3.0000	0.0113	2.9887	2.8719	0.0069	2.8650	2.7438	0.0127	2.7311

[a] To be dispensed with wherever possible.

[b] The use of 2 B.A. threads is recommended in place of 3/16 in. B.S.F.

Table 9 — Nuts — Medium class

Limits and Tolerances

1	2	3	4	5	6	7	8	9
Nominal size	Number of threads per inch	Major diameter	Effective diameter			Minor diameter		
		Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.
3/16 ab	32	0.1875	0.1708	0.0033	0.1675	0.1577	0.0102	0.1475
7/32 a	28	0.2188	0.1995	0.0036	0.1959	0.1841	0.0111	0.1730
1/4	26	0.2500	0.2291	0.0037	0.2254	0.2125	0.0117	0.2008
9/32 a	26	0.2812	0.2605	0.0039	0.2566	0.2437	0.0117	0.2320
5/16	22	0.3125	0.2875	0.0041	0.2834	0.2684	0.0141	0.2543
3/8	20	0.3750	0.3474	0.0044	0.3430	0.3280	0.0170	0.3110
7/16	18	0.4375	0.4066	0.0047	0.4019	0.3844	0.0181	0.3663
1/2	16	0.5000	0.4650	0.0050	0.4600	0.4395	0.0195	0.4200
9/16	16	0.5625	0.5277	0.0052	0.5225	0.5020	0.0195	0.4825
5/8	14	0.6250	0.5847	0.0054	0.5793	0.5549	0.0213	0.5336
11/16 a	14	0.6875	0.6474	0.0056	0.6418	0.6174	0.0213	0.5961
3/4	12	0.7500	0.7025	0.0059	0.6966	0.6669	0.0237	0.6432
7/8	11	0.8750	0.8230	0.0062	0.8168	0.7838	0.0252	0.7586
1	10	1.0000	0.9426	0.0066	0.9360	0.8990	0.0270	0.8720
1 1/8	9	1.1250	1.0608	0.0069	1.0539	1.0120	0.0292	0.9828
1 1/4	9	1.2500	1.1861	0.0072	1.1789	1.1370	0.0292	1.1078
1 3/8 a	8	1.3750	1.3025	0.0075	1.2950	1.2470	0.0320	1.2150
1 1/2	8	1.5000	1.4277	0.0077	1.4200	1.3720	0.0320	1.3400
1 5/8 a	8	1.6250	1.5529	0.0079	1.5450	1.4970	0.0320	1.4650
1 3/4	7	1.7500	1.6668	0.0083	1.6585	1.6026	0.0356	1.5670
2	7	2.0000	1.9172	0.0087	1.9085	1.8526	0.0356	1.8170
2 1/4	6	2.2500	2.1525	0.0092	2.1433	2.0769	0.0403	2.0366
2 1/2	6	2.5000	2.4028	0.0095	2.3933	2.3269	0.0403	2.2866
2 3/4	6	2.7500	2.6531	0.0098	2.6433	2.5769	0.0403	2.5366
3	5	3.0000	2.8822	0.0103	2.8719	2.7908	0.0470	2.7438

[a] To be dispensed with wherever possible.

[b] The use of 2 B.A. threads is recommended in place of 3/16 in. B.S.F.

Table 10 — Bolts — Medium class

Limits and Tolerances

a) **Nominal sizes up to and including $^3/_4$ in.**

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nominal size	Number of threads per inch	Major diameter				Effective diameter				Minor diameter			
		Unplated or before plating			After plating	Unplated or before plating			After plating	Unplated or before plating			After plating
		Max.	Tol.	Min.	Max.	Max.	Tol.	Min.	Max.	Max.	Tol.	Min.	Max.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
$^3/_{16}$ [ab]	32	0.1864	0.0051	0.1813	0.1875	0.1664	0.0033	0.1631	0.1675	0.1464	0.0068	0.1396	0.1475
$^7/_{32}$ [a]	28	0.2177	0.0055	0.2122	0.2188	0.1948	0.0036	0.1912	0.1959	0.1719	0.0074	0.1645	0.1730
$^1/_4$	26	0.2489	0.0057	0.2432	0.2500	0.2243	0.0037	0.2206	0.2254	0.1997	0.0076	0.1921	0.2008
$^9/_{32}$ [a]	26	0.2800	0.0059	0.2741	0.2812	0.2554	0.0039	0.2515	0.2566	0.2308	0.0078	0.2230	0.2320
$^5/_{16}$	22	0.3113	0.0062	0.3051	0.3125	0.2822	0.0041	0.2781	0.2834	0.2531	0.0084	0.2447	0.2543
$^3/_8$	20	0.3737	0.0066	0.3671	0.3750	0.3417	0.0044	0.3373	0.3430	0.3097	0.0089	0.3008	0.3110
$^7/_{16}$	18	0.4361	0.0071	0.4290	0.4375	0.4005	0.0047	0.3958	0.4019	0.3649	0.0094	0.3555	0.3663
$^1/_2$	16	0.4985	0.0075	0.4910	0.5000	0.4585	0.0050	0.4535	0.4600	0.4185	0.0100	0.4085	0.4200
$^9/_{16}$	16	0.5610	0.0077	0.5533	0.5625	0.5210	0.0052	0.5158	0.5225	0.4810	0.0102	0.4708	0.4825
$^5/_8$	14	0.6234	0.0081	0.6153	0.6250	0.5777	0.0054	0.5723	0.5793	0.5320	0.0107	0.5213	0.5336
$^{11}/_{16}$ [a]	14	0.6858	0.0083	0.6775	0.6875	0.6401	0.0056	0.6345	0.6418	0.5944	0.0109	0.5835	0.5961
$^3/_4$	12	0.7482	0.0088	0.7394	0.7500	0.6948	0.0059	0.6889	0.6966	0.6414	0.0117	0.6297	0.6432

b) **Nominal sizes above $^3/_4$ in.**

1	2	3	4	5	6	7	8	9	10	11
Nominal size	Number of threads per in.	Major diameter			Effective diameter			Minor diameter		
		Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.
$^7/_8$	11	0.8750	0.0092	0.8658	0.8168	0.0062	0.8106	0.7586	0.0122	0.7464
1	10	1.0000	0.0098	0.9902	0.9360	0.0066	0.9294	0.8720	0.0129	0.8591
$1^1/_8$	9	1.1250	0.0102	1.1148	1.0539	0.0069	1.0470	0.9828	0.0136	0.9692
$1^1/_4$	9	1.2500	0.0105	1.2395	1.1789	0.0072	1.1717	1.1078	0.0139	1.0939
$1^3/_8$ [a]	8	1.3750	0.0110	1.3640	1.2950	0.0075	1.2875	1.2150	0.0146	1.2004
$1^1/_2$	8	1.5000	0.0112	1.4888	1.4200	0.0077	1.4123	1.3400	0.0148	1.3252
$1^5/_8$ [a]	8	1.6250	0.0115	1.6135	1.5450	0.0079	1.5371	1.4650	0.0150	1.4500
$1^3/_4$	7	1.7500	0.0120	1.7380	1.6585	0.0083	1.6502	1.5670	0.0158	1.5512
2	7	2.0000	0.0124	1.9876	1.9085	0.0087	1.8998	1.8170	0.0162	1.8008
$2^1/_4$	6	2.2500	0.0132	2.2368	2.1433	0.0092	2.1341	2.0366	0.0173	2.0193
$2^1/_2$	6	2.5000	0.0136	2.4864	2.3933	0.0095	2.3838	2.2866	0.0177	2.2689
$2^3/_4$	6	2.7500	0.0139	2.7361	2.6433	0.0098	2.6335	2.5366	0.0180	2.5186
3	5	3.0000	0.0148	2.9852	2.8719	0.0103	2.8616	2.7438	0.0193	2.7245

[a] To be dispensed with wherever possible.

[b] The use of 2 B.A. threads is recommended in place of $^3/_{16}$ in. B.S.F.

Table 11 — Nuts — Normal class

Limits and Tolerances

1	2	3	4	5	6	7	8	9
Nominal size	Number of threads per inch	Major diameter	Effective diameter			Minor diameter		
		Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.
3/16 ab	32	0.1875	0.1725	0.0050	0.1675	0.1577	0.0102	0.1475
7/32 a	28	0.2188	0.2012	0.0053	0.1959	0.1841	0.0111	0.1730
1/4	26	0.2500	0.2310	0.0056	0.2254	0.2125	0.0117	0.2008
9/32 a	26	0.2812	0.2624	0.0058	0.2566	0.2437	0.0117	0.2320
5/16	22	0.3125	0.2896	0.0062	0.2834	0.2684	0.0141	0.2543
3/8	20	0.3750	0.3496	0.0066	0.3430	0.3280	0.0170	0.3110
7/16	18	0.4375	0.4089	0.0070	0.4019	0.3844	0.0181	0.3663
1/2	16	0.5000	0.4674	0.0074	0.4600	0.4395	0.0195	0.4200
9/16	16	0.5625	0.5302	0.0077	0.5225	0.5020	0.0195	0.4825
5/8	14	0.6250	0.5874	0.0081	0.5793	0.5549	0.0213	0.5336
11/16 a	14	0.6875	0.6502	0.0084	0.6418	0.6174	0.0213	0.5961
3/4	12	0.7500	0.7054	0.0088	0.6966	0.6669	0.0237	0.6432
7/8	11	0.8750	0.8261	0.0093	0.8168	0.7838	0.0252	0.7586
1	10	1.0000	0.9459	0.0099	0.9360	0.8990	0.0270	0.8720
1 1/8	9	1.1250	1.0643	0.0104	1.0539	1.0120	0.0292	0.9828
1 1/4	9	1.2500	1.1897	0.0108	1.1789	1.1370	0.0292	1.1078
1 3/8 a	8	1.3750	1.3063	0.0113	1.2950	1.2470	0.0320	1.2150
1 1/2	8	1.5000	1.4316	0.0116	1.4200	1.3720	0.0320	1.3400
1 5/8 a	8	1.6250	1.5569	0.0119	1.5450	1.4970	0.0320	1.4650
1 3/4	7	1.7500	1.6709	0.0124	1.6585	1.6026	0.0356	1.5670
2	7	2.0000	1.9215	0.0130	1.9085	1.8526	0.0356	1.8170
2 1/4	6	2.2500	2.1570	0.0137	2.1433	2.0769	0.0403	2.0366
2 1/2	6	2.5000	2.4075	0.0142	2.3933	2.3269	0.0403	2.2866
2 3/4	6	2.7500	2.6580	0.0147	2.6433	2.5769	0.0403	2.5366
3	5	3.0000	2.8874	0.0155	2.8719	2.7908	0.0470	2.7438

[a] To be dispensed with wherever possible.

[b] The use of 2 B.A. threads is recommended in place of 3/16 in. B.S.F.

Table 12 — Bolts — Free class

Limits and Tolerances

a) **Nominal sizes up to and including $^3/_4$ in.**

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nominal size	Number of threads per inch	Major diameter				Effective diameter				Minor diameter			
		Unplated or before plating			After plating	Unplated or before plating			After plating	Unplated or before plating			After plating
		Max.	Tol.	Min.	Max.	Max.	Tol.	Min.	Max.	Max.	Tol.	Min.	Max.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
$^3/_{16}$ [ab]	32	0.1864	0.0068	0.1796	0.1875	0.1664	0.0050	0.1614	0.1675	0.1464	0.0085	0.1379	0.1475
$^7/_{32}$ [a]	28	0.2177	0.0072	0.2105	0.2188	0.1948	0.0053	0.1895	0.1959	0.1719	0.0091	0.1628	0.1730
$^1/_4$	26	0.2489	0.0076	0.2413	0.2500	0.2243	0.0056	0.2187	0.2254	0.1997	0.0095	0.1902	0.2008
$^9/_{32}$ [a]	26	0.2800	0.0078	0.2722	0.2812	0.2554	0.0058	0.2496	0.2566	0.2308	0.0097	0.2211	0.2320
$^5/_{16}$	22	0.3113	0.0083	0.3030	0.3125	0.2822	0.0062	0.2760	0.2834	0.2531	0.0105	0.2426	0.2543
$^3/_8$	20	0.3737	0.0088	0.3649	0.3750	0.3417	0.0066	0.3351	0.3430	0.3097	0.0111	0.2986	0.3110
$^7/_{16}$	18	0.4361	0.0094	0.4267	0.4375	0.4005	0.0070	0.3935	0.4019	0.3649	0.0117	0.3532	0.3663
$^1/_2$	16	0.4985	0.0099	0.4886	0.5000	0.4585	0.0074	0.4511	0.4600	0.4185	0.0124	0.4061	0.4200
$^9/_{16}$	16	0.5610	0.0102	0.5508	0.5625	0.5210	0.0077	0.5133	0.5225	0.4810	0.0127	0.4683	0.4825
$^5/_8$	14	0.6234	0.0108	0.6126	0.6250	0.5777	0.0081	0.5696	0.5793	0.5320	0.0134	0.5186	0.5336
$^{11}/_{16}$ [a]	14	0.6858	0.0111	0.6747	0.6875	0.6401	0.0084	0.6317	0.6418	0.5944	0.0137	0.5807	0.5961
$^3/_4$	12	0.7482	0.0117	0.7365	0.7500	0.6948	0.0088	0.6860	0.6966	0.6414	0.0146	0.6268	0.6432

b) **Nominal sizes above $^3/_4$ in.**

1	2	3	4	5	6	7	8	9	10	11
Nominal size	Number of threads per in.	Major diameter			Effective diameter			Minor diameter		
		Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.
$^7/_8$	11	0.8750	0.0123	0.8627	0.8168	0.0093	0.8075	0.7586	0.0153	0.7433
1	10	1.0000	0.0131	0.9869	0.9360	0.0099	0.9261	0.8720	0.0162	0.8558
$1^1/_8$	9	1.1250	0.0137	1.1113	1.0539	0.0104	1.0435	0.9828	0.0171	0.9657
$1^1/_4$	9	1.2500	0.0141	1.2359	1.1789	0.0108	1.1681	1.1078	0.0175	1.0903
$1^3/_8$ [a]	8	1.3750	0.0148	1.3602	1.2950	0.0113	1.2837	1.2150	0.0184	1.1966
$1^1/_2$	8	1.5000	0.0151	1.4849	1.4200	0.0116	1.4084	1.3400	0.0187	1.3213
$1^5/_8$ [a]	8	1.6250	0.0155	1.6095	1.5450	0.0119	1.5331	1.4650	0.0190	1.4460
$1^3/_4$	7	1.7500	0.0162	1.7338	1.6585	0.0124	1.6461	1.5670	0.0200	1.5470
2	7	2.0000	0.0168	1.9832	1.9085	0.0130	1.8955	1.8170	0.0205	1.7965
$2^1/_4$	6	2.2500	0.0178	2.2322	2.1433	0.0137	2.1296	2.0366	0.0219	2.0147
$2^1/_2$	6	2.5000	0.0183	2.4817	2.3933	0.0142	2.3791	2.2866	0.0224	2.2642
$2^3/_4$	6	2.7500	0.0188	2.7312	2.6433	0.0147	2.6286	2.5366	0.0229	2.5137
3	5	3.0000	0.0199	2.9801	2.8719	0.0155	2.8564	2.7438	0.0244	2.7194

[a] To be dispensed with wherever possible.

[b] The use of 2 B.A. threads is recommended in place of $^3/_{16}$ in. B.S.F.

Introductory notes to Table 13 Selected thread series — Fractional sizes

1 Preferred diameters

It is strongly recommended that the preferred diameters should be used and, whenever the design permits, a "1st choice" diameter be selected.

In an extreme case, when even the "2nd choice" diameters cannot be utilized, a suitable "3rd choice" diameter should be selected as follows:—

a) Up to $1^1/_2$ in.: the nearest $^1/_{32}$ in. size.

b) Above $1^1/_2$ in. and up to 6 in.: the nearest $^1/_{16}$ in. size.

c) Above 6 in.: the nearest $^1/_8$ in. size.

Before selecting a “3rd choice” diameter, care should be taken to ascertain whether a “1st choice” or “2nd choice” in the alternative table of the decimal series could not be used instead.

2 Preferred pitches

The coarsest pitch suitable to the design should normally be used. Those pitches in brackets are included to meet less usual design requirements, and their general use should be avoided. However, in some specialized branches of design, particular pitches may be very commonly required and it may then be desirable to treat those most commonly required as “1st choice” pitches irrespective of the preference indicated above.

3 Extra fine pitches

These recommendations do not apply to extra fine pitches such as occur on thin-walled designs.

Selected thread series, Whit. S

Table 13 — Preferred diameters and pitches — Fractional sizes

1	2	3	4	5	6	7	8	9	10	11	12
Preferred basic major diameters		Standard pitches (t.p.i.)		Preferred pitches (t.p.i.)							
1st choice	2nd choice	B.S.W. series	B.S.F. series	4	6	8	12	16	20	26	32
in.	in.										
1/4	—	20	26	—	—	—	—	—	—	—	32
5/16	—	18	22	—	—	—	—	—	—	26	32
3/8	—	16	20	—	—	—	—	—	—	26	32
7/16	—	14	18	—	—	—	—	—	—	26	—
1/2	—	12	16	—	—	—	—	—	20	26	—
9/16	—	12	16	—	—	—	—	—	20	26	—
5/8	—	11	14	—	—	—	—	—	20	26	—
—	11/16	11	14	—	—	—	—	16	20	26	—
3/4	—	10	12	—	—	—	—	16	20	26	—
—	13/16	—	12	—	—	—	—	16	20	26	—
7/8	—	9	11	—	—	—	—	(16)	20	(26)	—
—	15/16	—	—	—	—	—	12	(16)	20	(26)	—
1	—	8	10	—	—	—	12	(16)	20	(26)	—
—	1 1/16	—	—	—	—	—	12	(16)	20	(26)	—
1 1/8	—	7	9	—	—	—	12	(16)	20	(26)	—
—	1 3/16	—	—	—	—	(8)	12	(16)	20	(26)	—
1 1/4	—	7	9	—	—	—	12	(16)	20	(26)	—
—	1 5/16	—	—	—	(6)	(8)	12	(16)	20	(26)	—
1 3/8	—	—	8	—	(6)	—	12	(16)	20	(26)	—
—	1 7/16	—	—	—	(6)	(8)	12	(16)	20	(26)	—

Table 13 — Preferred diameters and pitches — Fractional sizes

1	2	3	4	5	6	7	8	9	10	11	12
Preferred basic major diameters		**Standard pitches (t.p.i.)**		**Preferred pitches (t.p.i.)**							
1st choice	**2nd choice**	**B.S.W. series**	**B.S.F. series**	**4**	**6**	**8**	**12**	**16**	**20**	**26**	**32**
in.	in.										
$1^1/_2$	—	6	8	—	—	—	12	(16)	20	(26)	—
—	$1^5/_8$	—	8	—	(6)	—	12	16	20	(26)	—
$1^3/_4$	—	5	7	—	—	—	12	16	20	(26)	—
—	$1^7/_8$	—	—	—	(6)	(8)	12	16	20	(26)	—
2	—	$4^1/_2$	7	—	—	—	12	16	20	(26)	—
—	$2^1/_8$	—	—	—	(6)	8	12	16	(20)	—	—
$2^1/_4$	—	4	6	—	—	8	12	16	(20)	—	—
—	$2^3/_8$	—	—	—	(6)	8	12	16	(20)	—	—
$2^1/_2$	—	4	6	—	—	8	12	16	(20)	—	—
—	$2^5/_8$	—	—	—	(6)	8	12	16	(20)	—	—
$2^3/_4$	—	$3^1/_2$	6	—	—	8	12	16	(20)	—	—
—	$2^7/_8$	—	—	—	(6)	8	12	16	(20)	—	—
3	—	$3^1/_2$	5	—	(6)	8	12	16	(20)	—	—
—	$3^1/_8$	—	—	—	(6)	8	(12)	16	—	—	—
$3^1/_4$	—	$3^1/_4$	5	—	(6)	8	(12)	16	—	—	—
—	$3^3/_8$	—	—	—	(6)	8	(12)	16	—	—	—
$3^1/_2$	—	$3^1/_4$	$4^1/_2$	—	(6)	8	(12)	16	—	—	—
—	$3^5/_8$	—	—	—	(6)	8	(12)	16	—	—	—
$3^3/_4$	—	3	$4^1/_2$	—	(6)	8	(12)	16	—	—	—
—	$3^7/_8$	—	—	—	(6)	8	(12)	16	—	—	—
4	—	3	$4^1/_2$	—	(6)	8	(12)	16	—	—	—

Table 13 — Preferred diameters and pitches — Fractional sizes

1	2	3	4	5	6	7	8	9	10	11	12
Preferred basic major diameters		Standard pitches (t.p.i.)		Preferred pitches (t.p.i.)							
1st choice	2nd choice	B.S.W. series	B.S.F. series	4	6	8	12	16	20	26	32
in.	in.										
—	$4\frac{1}{8}$	—	—	—	(6)	8	(12)	16	—	—	—
$4\frac{1}{4}$	—	—	4	—	(6)	8	(12)	16	—	—	—
—	$4\frac{3}{8}$	—	—	4	(6)	8	(12)	16	—	—	—
$4\frac{1}{2}$	—	$2\frac{7}{8}$	—	4	(6)	8	(12)	16	—	—	—
—	$4\frac{5}{8}$	—	—	4	(6)	8	(12)	16	—	—	—
$4\frac{3}{4}$	—	—	—	4	(6)	8	(12)	16	—	—	—
—	$4\frac{7}{8}$	—	—	4	(6)	8	(12)	16	—	—	—
5	—	$2\frac{3}{4}$	—	4	(6)	8	(12)	16	—	—	—
—	$5\frac{1}{8}$	—	—	4	(6)	8	(12)	16	—	—	—
$5\frac{1}{4}$	—	—	—	4	(6)	8	(12)	16	—	—	—
—	$5\frac{3}{8}$	—	—	4	(6)	8	(12)	16	—	—	—
$5\frac{1}{2}$	—	$2\frac{5}{8}$	—	4	(6)	8	(12)	16	—	—	—
—	$5\frac{5}{8}$	—	—	4	(6)	8	(12)	16	—	—	—
$5\frac{3}{4}$	—	—	—	4	(6)	8	(12)	16	—	—	—
—	$5\frac{7}{8}$	—	—	4	(6)	8	(12)	16	—	—	—
6	—	$2\frac{1}{2}$	—	4	(6)	8	(12)	16	—	—	—
—	$6\frac{1}{4}$	—	—	4	(6)	8	(12)	16	—	—	—
$6\frac{1}{2}$	—	—	—	4	(6)	8	(12)	16	—	—	—
—	$6\frac{3}{4}$	—	—	4	(6)	8	(12)	16	—	—	—
7	—	—	—	4	6	8	12	16	—	—	—

NOTE Larger diameters have the same preferred diameter steps and the same preferred pitches as for the range 6.0 to 7.0 inches.

Introductory notes to Table 13A Selected thread series — Decimal sizes

1 Preferred diameters

It is strongly recommended that the preferred diameters should be used and that, whenever the design permits, a "1st choice" diameter be selected.

In an extreme case, when even the "2nd choice" diameters cannot be utilized, a suitable "3rd choice" diameter should be selected as follows:—

a) From 1.5 in. to 6 in.: select from the non-preferred 0.1 in. sizes, such as 2.2, 2.3, 2.7 and 2.8. Should these prove unsuitable, choose the nearest 0.05 in. diameter.

b) From 6 in. to 20 in.: select from the four 0.1 in. sizes similar to those shown in the table for the "2nd choice" below 6 in. Only as a last resort should the non-preferred 0.1 in. sizes such as 6.2, 6.3, 6.7 and 6.8 be used.

Before selecting a "3rd choice" diameter, care should be taken to ascertain whether a "1st choice" or "2nd choice" in the alternative table of the fractional series could not be used instead.

2 Preferred pitches

The coarsest pitch suitable to the design should normally be used. Those pitches in brackets are included to meet less usual design requirements and their general use should be avoided. However, in some specialized branches of design, particular pitches may be very commonly required, and it may then be desirable to treat those most commonly required as "1st choice" pitches irrespective of the preference indicated above.

3 Extra fine pitches

These recommendations do not apply to extra fine pitches such as occur on thin-walled designs.

Table 13A — Preferred diameters and pitches — Decimal sizes

1	2	3	4	5	6	7	8	9	10	11	12
Preferred basic major diameters		Standard pitches (t.p.i.)		Preferred pitches (t.p.i.)							
1st choice	2nd choice	B.S.W. series	B.S.F. series	4	6	8	12	16	20	26	32
in.	in.										
—	1.4	—	—	—	(6)	(8)	12	(16)	20	(26)	—
1.5	—	6	8	—	—	—	12	(16)	20	(26)	—
—	1.6	—	—	—	(6)	(8)	12	16	10	(26)	—
1.75	—	5	7	—	—	—	12	16	20	(26)	—
—	1.9	—	—	—	(6)	(8)	12	16	20	(26)	—
2.0	—	$4^1/_2$	7	—	—	—	12	16	20	(26)	—
—	2.1	—	—	—	(6)	8	12	16	(20)	—	—
2.25	—	4	6	—	—	8	12	16	(20)	—	—
—	2.4	—	—	—	(6)	8	12	16	(20)	—	—
2.5	—	4	6	—	—	8	12	16	(20)	—	—
—	2.6	—	—	—	(6)	8	12	16	(20)	—	—
2.75	—	$3^1/_2$	6	—	—	8	12	16	(20)	—	—
—	2.9	—	—	—	(6)	8	12	16	(20)	—	—
3.0	—	$3^1/_2$	5	—	(6)	8	12	16	(20)	—	—
—	3.1	—	—	—	(6)	8	(12)	16	—	—	—
3.25	—	$3^1/_4$	5	—	(6)	8	(12)	16	—	—	—
—	3.4	—	—	—	(6)	8	(12)	16	—	—	—
3.5	—	$3^1/_4$	$4^1/_2$	—	(6)	8	(12)	16	—	—	—
—	3.6	—	—	—	(6)	8	(12)	16	—	—	—
3.75	—	3	$4^1/_2$	—	(6)	8	(12)	16	—	—	—
—	3.9	—	—	—	(6)	8	(12)	16	—	—	—

Table 13A — Preferred diameters and pitches — Decimal sizes

1	2	3	4	5	6	7	8	9	10	11	12
Preferred basic major diameters		**Standard pitches (t.p.i.)**		**Preferred pitches (t.p.i.)**							
1st choice	**2nd choice**	**B.S.W. series**	**B.S.F. series**	**4**	**6**	**8**	**12**	**16**	**20**	**26**	**32**
in.	in.										
4.0	—	3	$4^1/_2$	—	(6)	8	(12)	16	—	—	—
—	4.1	—	—	—	(6)	8	(12)	16	—	—	—
4.25	—	—	4	—	(6)	8	(12)	16	—	—	—
—	4.4	—	—	4	(6)	8	(12)	16	—	—	—
4.5	—	$2^7/_8$	—	4	(6)	8	(12)	16	—	—	—
—	4.6	—	—	4	(6)	8	(12)	16	—	—	—
4.75	—	—	—	4	(6)	8	(12)	16	—	—	—
—	4.9	—	—	4	(6)	8	(12)	16	—	—	—
5.0	—	$2^3/_4$	—	4	(6)	8	(12)	16	—	—	—
—	5.1	—	—	4	(6)	8	(12)	16	—	—	—
5.25	—	—	—	4	(6)	8	(12)	16	—	—	—
—	5.4	—	—	4	(6)	8	(12)	16	—	—	—
5.5	—	$2^5/_8$	—	4	(6)	8	(12)	16	—	—	—
—	5.6	—	—	4	(6)	8	(12)	16	—	—	—
5.75	—	—	—	4	(6)	8	(12)	16	—	—	—
—	5.9	—	—	4	(6)	8	(12)	16	—	—	—
6.0	—	$2^1/_2$	—	4	(6)	8	(12)	16	—	—	—
—	6.25	—	—	4	(6)	8	(12)	16	—	—	—
6.5	—	—	—	4	(6)	8	(12)	16	—	—	—
—	6.75	—	—	4	(6)	8	(12)	16	—	—	—
7.0	—	—	—	4	6	8	12	16	—	—	—

NOTE Larger diameters have the same preferred diameter steps and the same preferred pitches as for the range 6.0 to 7.0 inches.

Table 14 — Depths of thread for various pitches

1	2	3	4
Number of threads per inch[a]	**Pitch**	**Basic depth of threads**	**Twice basic depth of thread**
	in.	in.	in.
40	0.02500	0.0160	0.0320
36	0.02778	0.0178	0.0356
32	0.03125	0.0200	0.0400
28	0.03571	0.0229	0.0458
26	0.03846	0.0246	0.0492
24	0.04167	0.0267	0.0534
20	0.05000	0.0320	0.0640
18	0.05556	0.0356	0.0712
16	0.06250	0.0400	0.0800
14	0.07143	0.0457	0.0914
12	0.08333	0.0534	0.1068
11	0.09091	0.0582	0.1164
10	0.10000	0.0640	0.1280
8	0.12500	0.0800	0.1600
6	0.16667	0.1067	0.2134
4	0.25000	0.1601	0.3202

NOTE Basic effective diameter = basic major diameter — basic depth of thread (Col. 3).
Basic minor diameter = basic major diameter — twice basic depth of thread (Col. 4).
[a] The numbers of t.p.i. in heavy type are to be preferred.

Whitworth form special threads
Examples illustrating the use of Table 14 to Table 20

Example 1. Bolt 1.25 in. — 12 Whit. S. (close)
Nut 1.25 in. — 12 Whit. S. (medium)

Basic and design sizes for bolt and nut:—

Major dia.	1.2500 in.	
Effective dia.	1.2500 – 0.0534 = 1.1966 in.	Table 14
Minor dia.	1.2500 – 0.1068 = 1.1432 in.	Table 14

Tolerances for bolt (close class):—

Effective dia.	— 0.0042 in.	Table 16
Major dia.	– (0.0042 + 0.0029) = – 0.0071 in.	Table 16
Minor dia.	– (0.0042 + 0.0038) = – 0.0080 in.	Table 16

Tolerances for nut (medium class):—

Effective dia.	+ 0.0062 in.	Table 17
Minor dia.	+ 0.0237 in.	Table 17

Limits:—

Bolt.	Major dia.	1.2500 to 1.2429 in.
	Effective dia.	1.1966 to 1.1924 in.
	Minor dia.	1.1432 to 1.1352 in.
Nut.	Major dia.	Not less than 1.2500 in.
	Effective dia.	1.1966 to 1.2028 in.
	Minor dia.	1.1432 to 1.1669 in.

Example 2. Bolt 0.5 in. — 20 Whit. S. (free)
Nut 0.5 in. — 20 Whit. S. (normal)

Basic sizes for bolt and nut and design sizes for nut:—

Major dia.	0.5000 in.	
Effective dia.	0.5000 – 0.0320 = 0.4680 in.	Table 14
Minor dia.	0.5000 – 0.0640 = 0.4360 in.	Table 14

Design sizes for bolt:—

Major dia.	Basic size — Allowance = 0.5000 – 0.0014 = 0.4986 in.	Table 15
Effective dia.	Basic size — Allowance = 0.4680 – 0.0014 = 0.4666 in.	Table 15
Minor dia.	Basic size — Allowance = 0.4360 – 0.0014 = 0.4346 in.	Table 15

Tolerances for bolt (free class):—

Effective dia.	— 0.0068	Table 20
Major dia.	— (0.0068 + 0.0022) = – 0.0090 in.	Table 20
Minor dia.	— (0.0068 + 0.0045) = – 0.0113 in.	Table 20

Tolerances for nut (normal class):—

Effective dia.	+ 0.0068 in.	Table 19
Minor dia.	+ 0.0170 in.	Table 19

Limits:—

Bolt.	Major dia.	0.4986 to 0.4896 in.
	Effective dia.	0.4666 to 0.4598 in.
	Minor dia.	0.4346 to 0.4233 in.
Nut.	Major dia.	Not less than 0.5000 in.
	Effective dia.	0.4680 to 0.4748 in.
	Minor dia.	0.4360 to 0.4530 in.

Table 15 — Bolts — Medium and free class allowances

Diameters in inches — Unit of allowance = 0.001 in.

Number of threads per in.[a]	Allowance on major, effective and minor diameters			
	Basic major diameter above	1/8	1/4	1/2
	Basic major diameter up to and including	1/4	1/2	3/4
40, 36		1.1	1.2	1.2
32, 28		1.2	1.3	1.3
26, 24		1.2	1.3	1.4
20			1.4	1.5
18, 16			1.5	1.6
14, 12				1.8

[a] The numbers of t.p.i. in heavy type are to be preferred.

Table 16 — Bolts — Close class

Tolerances

Diameters in inches — Unit of tolerance = 0.001 in.

Number of threads per in.[a]	Tolerance on effective diameter												Tolerance on major diameter	Tolerance on minor diameter
	Basic major diameter above	1/8	1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	Add the following to the "tolerance on effective diameter"	
	Basic major diameter up to and including	1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	20		
40, 36		2.4	2.6	2.8	3.0	3.2								1.7	2.2
32, 28		2.5	2.7	2.9	3.1	3.3								1.9	2.5
26, 24		2.8	3.0	3.1	3.3	3.6	3.8							2.0	2.7
20			3.0	3.2	3.4	3.6	3.9							2.2	2.9
18, 16			3.4	3.6	3.7	4.0	4.2	4.4	4.7					2.5	3.2
14, 12				4.0	4.2	4.4	4.6	4.9	5.1					2.9	3.8
11, 10					4.3	4.5	4.7	4.9	5.2	5.5				3.2	4.1
8					4.7	5.0	5.2	5.4	5.7	6.0	6.2			3.5	4.6
6						5.6	5.8	6.0	6.3	6.6	6.8	7.1		4.1	5.3
4							6.6	6.9	7.1	7.4	7.7	8.0	8.3	5.0	6.5

[a] The numbers of t.p.i. in heavy type are to be preferred.

Table 17 — Nuts — Medium class

Tolerances

Diameters in inches — Unit of tolerance = 0.001 in.

Number of threads per in.[a]	Tolerance on effective diameter													Tolerance on minor diameter
Basic major diameter above		1/8	1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	Total tolerance
Basic major diameter up to and including		1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	20	
40, 36		3.7	4.0	4.2	4.5	4.9								9.6
32, 28		3.8	4.1	4.3	4.6	5.0								11.1
26, 24		4.1	4.4	4.7	5.0	5.4	5.7							13.3
20			4.5	4.8	5.1	5.5	5.8							17.0
18, 16			5.1	5.3	5.6	6.0	6.3	6.7	7.0					19.5
14, 12				6.0	6.2	6.6	7.0	7.3	7.7					23.7
11, 10					6.4	6.7	7.1	7.4	7.8	8.2				27.0
8					7.1	7.5	7.8	8.2	8.5	8.9	9.4			32.0
6						8.4	8.7	9.0	9.4	9.8	10.2	10.7		40.3
4							10.0	10.3	10.7	11.1	11.5	11.9	12.4	57.0

[a] The numbers of t.p.i. in heavy type are to be preferred.

Table 18 — Bolts — Medium class

Tolerances

Diameters in inches — Unit of tolerance = 0.001 in.

Number of threads per in.[a]	Tolerance on effective diameter													Tolerance on major diameter	Tolerance on minor diameter
Basic major diameter above		1/8	1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	Add the following to the "tolerance on effective diameter"	
Basic major diameter up to and including		1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	20		
40, 36		3.7	4.0	4.2	4.5	4.9								1.7	3.3
32, 28		3.8	4.1	4.3	4.6	5.0								1.9	3.8
26, 24		4.1	4.4	4.7	5.0	5.4	5.7							2.0	4.1
20			4.5	4.8	5.1	5.5	5.8							2.2	4.5
18, 16			5.1	5.3	5.6	6.0	6.3	6.7	7.0					2.5	5.0
14, 12				6.0	6.2	6.6	7.0	7.3	7.7					2.9	5.8
11, 10					6.4	6.7	7.1	7.4	7.8	8.2				3.2	6.3
8					7.1	7.5	7.8	8.2	8.5	8.9	9.4			3.5	7.1
6						8.4	8.7	9.0	9.4	9.8	10.2	10.7		4.1	8.2
4							10.0	10.3	10.7	11.1	11.5	11.9	12.4	5.0	10.0

[a] The numbers of t.p.i. in heavy type are to be preferred.

Table 19 — Nuts — Normal class

Tolerances

Diameters in inches — Unit of tolerance = 0.001 in.

Number of threads per in.[a]	Tolerance on effective diameter													Tolerance on minor diameter
	Basic major diameter above		1/8	1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	
	Basic major diameter up to and including		1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	20	Total tolerance
40, 36			5.6	6.0	6.3	6.8	7.3								9.6
32, 28			5.7	6.2	6.5	6.9	7.5								11.1
26, 24			6.2	6.7	7.1	7.5	8.0	8.6							13.3
20				6.8	7.2	7.7	8.2	8.7							17.0
18, 16				7.6	8.0	8.4	9.0	9.5	10.0	10.6					19.5
14, 12					8.9	9.4	9.9	10.4	10.9	11.5					23.7
11, 10						9.6	10.1	10.7	11.1	11.7	12.3				27.0
8						10.7	11.2	11.8	12.2	12.8	13.4	14.0			32.0
6							12.5	13.1	13.6	14.1	14.8	15.4	16.1		40.3
4								14.9	15.4	16.0	16.6	17.2	17.9	18.7	57.0

[a] The numbers of t.p.i. in heavy type are to be preferred.

Table 20 — Bolts — Free class

Tolerances

Diameters in inches — Unit of tolerance = 0.001 in.

Number of threads per in.[a]	Tolerance on effective diameter													Tolerance on major diameter	Tolerance on minor diameter
	Basic major diameter above		1/8	1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	Add the following to the "tolerance on effective diameter"	
	Basic major diameter up to and including		1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	20		
26, 24			6.2	6.7	7.1	7.5	8.0	8.6							2.0	4.1
20				6.8	7.2	7.7	8.2	8.7							2.2	4.5
18, 16				7.6	8.0	8.4	9.0	9.5	10.0	10.6					2.5	5.0
14, 12					8.9	9.4	9.9	10.4	10.9	11.5					2.9	5.8
11, 10						9.6	10.1	10.7	11.1	11.7	12.3				3.2	6.3
8						10.7	11.2	11.8	12.2	12.8	13.4	14.0			3.5	7.1
6							12.5	13.1	13.6	14.1	14.8	15.4	16.1		4.1	8.2
4								14.9	15.4	16.0	16.6	17.2	17.9	18.7	5.0	10.0

[a] The numbers of t.p.i. in heavy type are to be preferred.

Appendix A Truncated Whitworth form threads with flat crests

Truncated Whitworth threads are only to be supplied when specially ordered or by arrangement with the purchaser.

Form of truncated Whitworth thread. In the truncated Whitworth form of thread the basic rounded crests at the major diameter of the bolt and the minor diameter of the nut are removed at their junctions with the straight flanks of the basic thread form (see Figure 7). The resulting flat crests of the threads are given suitable manufacturing tolerances, which are negative on the bolt and positive on the nut.

NOTE In the case of nuts of standard Whitworth form, by virtue of the generous tolerance allowed on the minor diameter of the nut, the form of the crest of the thread at the minor diameter of the nut may vary between the basic rounding at the minimum diameter and a flat at the maximum diameter. For a nut with a truncated thread made in accordance with the present Appendix, the crest of the thread at the minor diameter will always be flat, the minimum minor diameter corresponding with the point of tangency of the radius of the normal Whitworth form thread and the maximum minor diameter to that laid down for ordinary Whitworth form threads.

Tolerances. For truncated threads, the limits and tolerances are the same as for threads of standard Whitworth form, with the exception of the major diameters of the bolts and the minor diameters of the nuts.

Tolerances on major diameter of bolt and minor diameter of nut. Figure 7 shows the upper and lower limiting outlines of a close class bolt and medium class nut with truncated threads. In the case of the bolt, the design size of the major diameter is reduced by an amount U equal to double the depth of the normal rounded crest, which is equal to $0.147835p$. U is twice the distance, measured normal to the axis, from the intersection of the radius r with the flank of the thread to the basic major diameter. This is shown in Figure 7. In the case of the nut, the design size of the minor diameter is increased by the same amount.

The tolerances on the flat crests at the major diameter of the bolt and on the flat crests at the minor diameter of the nut are denoted by A and B respectively. For any one pitch these tolerances remain unchanged for all recommended combinations of classes of bolts and nuts.

The following formulae are used for determining A and B:

$U + A = 0.2\,p + 0.003$ in.

A is the difference between the rounded-off values of $(U + A)$ and U.

In the case of the nut, the upper limit of tolerance for the flat crests at the minor diameter is made the same as that for threads of standard Whitworth form, so that:

$U + B = 0.2\,p + 0.004$ in. for 26 t.p.i. and finer

$0.2\,p + 0.005$ in. for 24 and 22 t.p.i.

$0.2\,p + 0.007$ in. for 20 t.p.i. and coarser

B is the difference between the rounded-off values of $(U + B)$ and U.

The values of U, A and B are given in Table 21.

Table 22 and Table 23 give the maximum and minimum values of the major diameters of bolts and minor diameters of nuts for B.S.W. and B.S.F. truncated threads.

Designation of truncated Whitworth form threads. Truncated Whitworth form threads shall be designated as laid down on page 4 for normal Whitworth form threads with the addition of the abbreviation "trunc.".

Gauging system for truncated Whitworth form threads. The following limit-gauging system is recommended for controlling truncated Whitworth form threads:—

For bolt:—

i) GO screw ring or calliper gauge.

ii) NOT GO effective diameter calliper gauge.

iii) GO plain calliper gauge for flat crests.

iv) NOT GO plain calliper gauge for flat crests.

For nut:—

i) GO screw plug gauge.

ii) NOT GO effective diameter plug gauge.

iii) GO plain plug gauge for flat crests.

iv) NOT GO plain plug gauge for flat crests.

If it is desired to ensure assembly between parts, *both of which have truncated threads*, the two GO screw gauges i) could also have truncated threads. The roots of the threads of these gauges should not be cleared however, but should conform to the normal Whitworth form threads at the roots, in order to control possible eccentricity between the flat crests of the truncated threads on the parts and their effective diameters. On the other hand, if it is desired to ensure assembly between parts made by one manufacturer with truncated threads and parts made by another manufacturer which may have normal Whitworth form threads, the two GO screw gauges for the truncated threads must have normal rounded crests as well as normal rounded roots.

As a general practice, therefore, it is recommended that the two GO screw gauges for truncated threads should have normal (full form) Whitworth threads. The threads of the two NOT GO effective diameter gauges should, as usual, be cleared at the crests and roots, as recommended in BS 919, "*Screw thread gauge tolerances*".

The GO plain calliper gauge and the GO plain plug gauge referred to in iii) above are not strictly essential, if the GO screw gauges have normal rounded roots, as recommended above. In the event of the work refusing to pass the GO screw gauges, however, these plain GO gauges for the crests of the thread could be usefully employed to determine whether or not the flat crest diameter of the bolt was dimensionally too large, or the flat minor diameter of the nut too small.

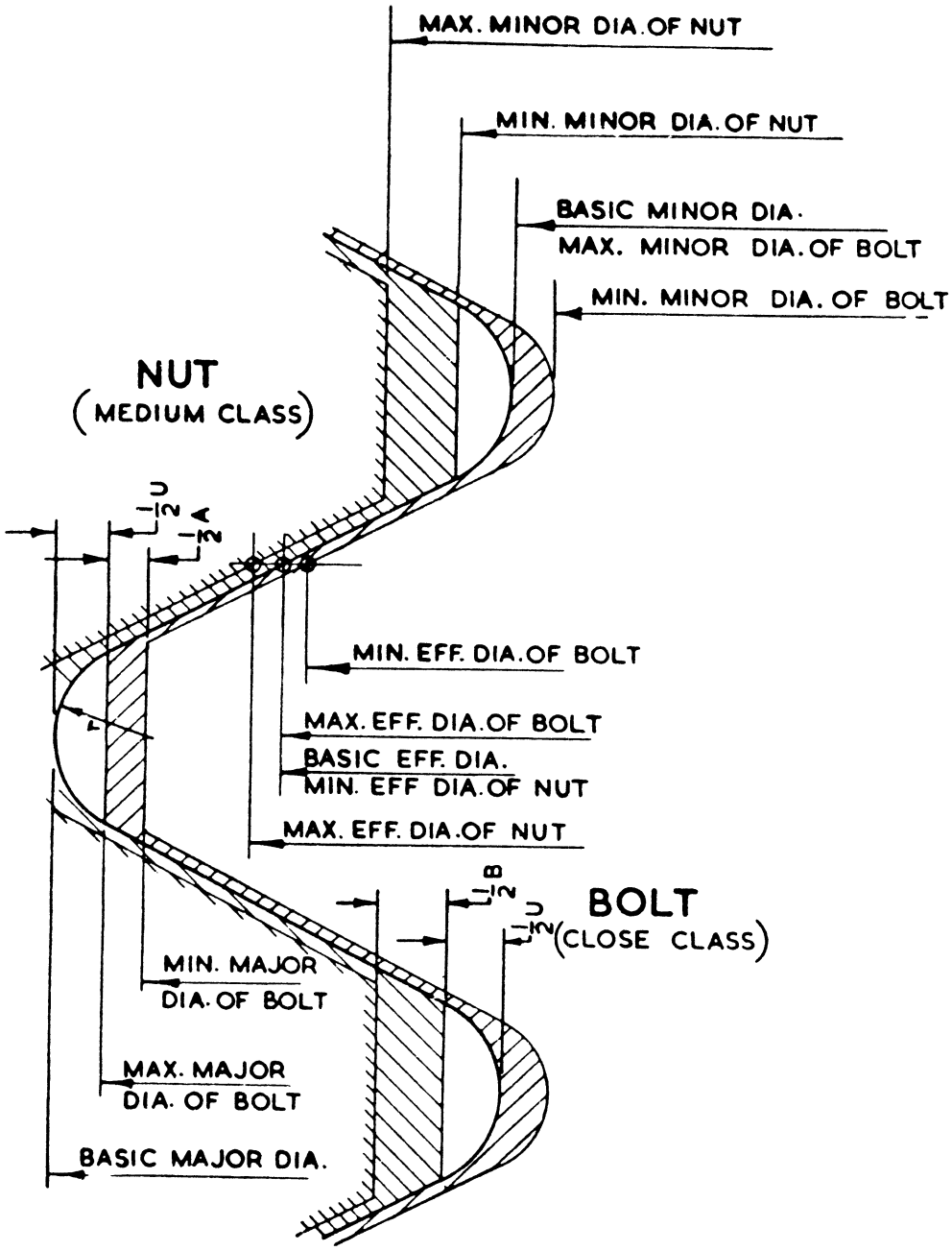


Figure 7 — Tolerance zones for truncated Whitworth thread $^1/_4$ in. B.S.W. (20 t.p.i.) illustrated
Close class bolt and medium class nut.

Table 21 — Basic data

Unit = 0.001 inch

1	2	3	4	5
Number of threads per inch	Bolt — major diameter		Nut — minor diameter	
	Nominal truncation	Tolerance on truncated major diameter	Nominal truncation	Tolerance on truncated minor diameter
	U[a]	A[a]	U[a]	B[a]
40	3.7	4.3	3.7	5.3
36	4.1	4.5	4.1	5.5
32	4.6	4.6	4.6	5.6
28	5.3	4.8	5.3	5.8
26	5.7	5.0	5.7	6.0
24	6.2	5.1	6.2	7.1
22	6.7	5.4	6.7	7.4
20	7.4	5.6	7.4	9.6
19	7.8	5.7	7.8	9.7
18	8.2	5.9	8.2	9.9
16	9.2	6.3	9.2	10.3
14	10.6	6.7	10.6	10.7
12	12.3	7.4	12.3	11.4
11	13.4	7.8	13.4	11.8
10	14.8	8.2	14.8	12.2
9	16.4	8.8	16.4	12.8
8	18.5	9.5	18.5	13.5
7	21.1	10.5	21.1	14.5
6	24.6	11.7	24.6	15.7
5	29.6	13.4	29.6	17.4
4.5	32.9	14.5	32.9	18.5
4	37.0	16.0	37.0	20.0
3.5	42.2	17.9	42.2	21.9
3.25	45.5	19.0	45.5	23.0
3	49.3	20.4	49.3	24.4
2.875	51.4	21.2	51.4	25.2
2.75	53.8	21.9	53.8	25.9
2.625	56.3	22.9	56.3	26.9
2.5	59.1	23.9	59.1	27.9

NOTE 1 To obtain the upper limit for the major diameter of the truncated thread of a close class bolt, subtract the value in Col. 2 from its basic major diameter. To obtain the upper limit for the major diameter of the truncated thread of a medium or free class bolt subtract the sum of the appropriate allowance, if any, and the value in Col. 2 from its basic major diameter. To obtain the lower limit for the minor diameter of the truncated thread of a nut, add the value in Col. 4 to its basic minor diameter.

NOTE 2 The tolerances on bolts are negative and those on nuts positive.

NOTE 3 For any one pitch the tolerances for all classes of bolts are the same and for all classes of nuts are the same.

[a] See Figure 7.

Truncated coarse thread series, B.S.W

Table 22 — Bolts and nuts — all classes

Limits and Tolerances

1	2	3	4	5	6	7	8	9	10	11
Nominal size	Number of threads per in.	Bolt — major diameter close class			Bolt — major diameter medium and free classes			Nut — minor diameter all classes		
		Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.
1/8 [a]	40	0.1213	0.0043	0.1170	0.1201	0.0043	0.1158	0.1020	0.0053	0.0967
3/16	24	0.1813	0.0051	0.1762	0.1801	0.0051	0.1750	0.1474	0.0071	0.1403
1/4	20	0.2426	0.0056	0.2370	0.2414	0.0056	0.2358	0.2030	0.0096	0.1934
5/16	18	0.3043	0.0059	0.2984	0.3030	0.0059	0.2971	0.2594	0.0099	0.2495
3/8	16	0.3658	0.0063	0.3595	0.3644	0.0063	0.3581	0.3145	0.0103	0.3042
7/16	14	0.4269	0.0067	0.4202	0.4254	0.0067	0.4187	0.3674	0.0107	0.3567
1/2	12	0.4877	0.0074	0.4803	0.4862	0.0074	0.4788	0.4169	0.0114	0.4055
9/16 [a]	12	0.5502	0.0074	0.5428	0.5486	0.0074	0.5412	0.4794	0.0114	0.4680
5/8	11	0.6116	0.0078	0.6038	0.6099	0.0078	0.6021	0.5338	0.0118	0.5220
11/16 [a]	11	0.6741	0.0078	0.6663	0.6724	0.0078	0.6646	0.5963	0.0118	0.5845
3/4	10	0.7352	0.0082	0.7270	0.7334	0.0082	0.7252	0.6490	0.0122	0.6368
7/8	9	0.8586	0.0088	0.8498				0.7620	0.0128	0.7492
1	8	0.9815	0.0095	0.9720				0.8720	0.0135	0.8585
1 1/8	7	1.1039	0.0105	1.0934				0.9776	0.0145	0.9631
1 1/4	7	1.2289	0.0105	1.2184				1.1026	0.0145	1.0881
1 1/2	6	1.4754	0.0117	1.4637				1.3269	0.0157	1.3112
1 3/4	5	1.7204	0.0134	1.7070				1.5408	0.0174	1.5234
2	4.5	1.9671	0.0145	1.9526				1.7668	0.0185	1.7483
2 1/4	4	2.2130	0.0160	2.1970	The Limits and Tolerances for			1.9868	0.0200	1.9668
2 1/2	4	2.4630	0.0160	2.4470	Nominal Sizes above 3/4 in. are the			2.2368	0.0200	2.2168
2 3/4	3.5	2.7078	0.0179	2.6899	same as those of the corresponding size of Close Class bolt			2.4481	0.0219	2.4262
3	3.5	2.9578	0.0179	2.9399				2.6981	0.0219	2.6762
3 1/4 [a]	3.25	3.2045	0.0190	3.1855				2.9245	0.0230	2.9015
3 1/2	3.25	3.4545	0.0190	3.4355				3.1745	0.0230	3.1515
3 3/4 [a]	3	3.7007	0.0204	3.6803				3.3969	0.0244	3.3725
4	3	3.9507	0.0204	3.9303				3.6469	0.0244	3.6225
4 1/2	2.875	4.4486	0.0212	4.4274				4.1312	0.0252	4.1060
5	2.75	4.9462	0.0219	4.9243				4.6141	0.0259	4.5882
5 1/2	2.625	5.4437	0.0229	5.4208				5.0954	0.0269	5.0685
6	2.5	5.9409	0.0239	5.9170				5.5748	0.0279	5.5469

[a] To be dispensed with wherever possible.

Table 23 — Bolts and nuts — all classes

Limits and Tolerances

1	2	3	4	5	6	7	8	9	10	11
Nominal size	Number of threads per in.	Bolt — major diameter close class			Bolt — major diameter medium and free classes			Nut — minor diameter all classes		
		Max.	Tol.	Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.	in.	in.
3/16 [a]	32	0.1829	0.0046	0.1783	0.1818	0.0046	0.1772	0.1577	0.0056	0.1521
7/32 [a]	28	0.2135	0.0048	0.2087	0.2124	0.0048	0.2076	0.1841	0.0058	0.1783
1/4	26	0.2443	0.0050	0.2393	0.2432	0.0050	0.2382	0.2125	0.0060	0.2065
9/32 [a]	26	0.2755	0.0050	0.2705	0.2743	0.0050	0.2693	0.2437	0.0060	0.2377
5/16	22	0.3058	0.0054	0.3004	0.3046	0.0054	0.2992	0.2684	0.0074	0.2610
3/8	20	0.3676	0.0056	0.3620	0.3663	0.0056	0.3607	0.3280	0.0096	0.3184
7/16	18	0.4293	0.0059	0.4234	0.4279	0.0059	0.4220	0.3844	0.0099	0.3745
1/2	16	0.4908	0.0063	0.4845	0.4893	0.0063	0.4830	0.4395	0.0103	0.4292
9/16	16	0.5533	0.0063	0.5470	0.5518	0.0063	0.5455	0.5020	0.0103	0.4917
5/8	14	0.6144	0.0067	0.6077	0.6128	0.0067	0.6061	0.5549	0.0107	0.5442
11/16 [a]	14	0.6769	0.0067	0.6702	0.6752	0.0067	0.6685	0.6174	0.0107	0.6067
3/4	12	0.7377	0.0074	0.7303	0.7359	0.0074	0.7285	0.6669	0.0114	0.6555
7/8	11	0.8616	0.0078	0.8538				0.7838	0.0118	0.7720
1	10	0.9852	0.0082	0.9770				0.8990	0.0122	0.8868
1 1/8	9	1.1086	0.0088	1.0998				1.0120	0.0128	0.9992
1 1/4	9	1.2336	0.0088	1.2248				1.1370	0.0128	1.1242
1 3/8 [a]	8	1.3565	0.0095	1.3470				1.2470	0.0135	1.2335
1 1/2	8	1.4815	0.0095	1.4720	The Limits and Tolerances for Nominal sizes above 3/4 in. are the same as those of the corresponding size of Close Class bolt			1.3720	0.0135	1.3585
1 5/8 [a]	8	1.6065	0.0095	1.5970				1.4970	0.0135	1.4835
1 3/4	7	1.7289	0.0105	1.7184				1.6026	0.0145	1.5881
2	7	1.9789	0.0105	1.9684				1.8526	0.0145	1.8381
2 1/4	6	2.2254	0.0117	2.2137				2.0769	0.0157	2.0612
2 1/2	6	2.4754	0.0117	2.4637				2.3269	0.0157	2.3112
2 3/4	6	2.7254	0.0117	2.7137				2.5769	0.0157	2.5612
3	5	2.9704	0.0134	2.9570				2.7908	0.0174	2.7734

[a] To be dispensed with wherever possible.

Appendix B Bases of tolerances and allowances for Whitworth form screw threads

In deciding upon suitable bases for calculating tolerances and allowances for Whitworth form screw threads, the aim has been to provide a minimum number of simple formulae which would be applicable to the several classes and to all reasonable combinations of diameter and pitch. The formulae adopted give tolerances sufficiently large for the usual methods of screw thread manufacture but not so large that the satisfactory functioning of the screw threads is impaired.

Classes of tolerance. The relative magnitudes and dispositions of the effective diameter tolerance zones for the close, medium and free classes of bolts and the medium and normal classes of nuts are shown in Figure 2.

The close class bolt and nut effective diameter tolerances are two-thirds of the corresponding values of the medium class bolt and nut tolerances respectively.

The free class bolt and normal class nut effective diameter tolerances are one and a half times the corresponding values of the medium class tolerances.

Allowances. The free class and medium class bolts of nominal sizes 3/4 in. down to 1/4 in. have an allowance equal to 30 per cent of the medium class bolt effective diameter tolerance. The allowance for nominal sizes less than 1/4 in. is the same as that for 1/4 in.

The close class bolt has no allowance.

Effective diameter tolerances. The tolerances for effective diameter are primarily based upon the accuracy of present day screwing tools and, starting from this basis, a general formula was derived in BS 84:1940 for these tolerances which is applicable not only to screw threads belonging to the standard series but also to any others having a reasonable combination of diameter, pitch and length of engagement.

This formula is:

Medium class bolt and nut tolerances on effective diameter in inches equal

$$0.002\sqrt[3]{D} + 0.003\sqrt{L_e} + 0.005\sqrt{p}$$

where D = basic major diameter of thread in inches

L_e = length of engagement in inches

p = pitch in inches.

Effective diameter tolerances for close and normal class nuts and close and free class bolts are obtained by multiplying the values obtained from this formula by the factors stated in the paragraph headed "Classes of Tolerance".

The effective diameter tolerance given in Table 2 to Table 6 and Table 8 to Table 12 for the B.S.W. and B.S.F. series respectively, are based on a length of engagement equal to the nominal diameter of the thread, this length being approximately equal to that of a standard nut.

The effective diameter tolerances given in Table 16 to Table 20 for Whitworth Special threads are based on a length of engagement of ten pitches (10p) as this length of engagement approximates to that commonly used in practice for such threads.

Major diameter tolerances. *Bolt*. The tolerance on the major diameter of a bolt is derived from the tolerance on its effective diameter by adding to it an amount equal to $0.01\sqrt{p}$. This rule applies to all three classes of bolt.

Nut. No tolerance is specified for the major diameter of a nut, but only the minimum size, which is the same as the basic major diameter. It is considered that the major diameters of nuts will be effectively controlled by the major diameters of the taps or other screwing tools used.

Minor diameter tolerances. *Bolt*. The tolerance on the minor diameter of a bolt is related to the corresponding effective diameter tolerance, since the root of the bolt thread is formed in the same manufacturing operation as the flanks. Account is also taken of the fact that wear on the cutting or forming tool is greater on the crest of the thread than on the flanks. This is commonly allowed for in practice by making the crests of the thread on the tool to a smaller radius than the basic root radius of the bolt thread.

The tolerance on the minor diameter of a bolt is derived from the tolerance on its effective diameter by adding to it an amount equal to $0.013\sqrt{p}$ in the case of close class bolts and $0.02\sqrt{p}$ for both medium and free class bolts.

Nut. The tolerance on the minor diameter of a nut, which is the same for all classes, is as follows:

Tolerance on minor diameter of nut =
- $0.2p$ + 0.004 in. for 26 t.p.i. and finer
- $0.2p$ + 0.005 in. for 24 t.p.i. and 22 t.p.i.
- $0.2p$ + 0.007 in. for 20 t.p.i. and coarser.

Minimum depths of engagement. The bolt major diameter tolerances and the nut minor diameter tolerances provide, in conjunction with the allowance, if any, a minimum depth of engagement of approximately 50 per cent of the basic depth of the Whitworth screw thread form.

Appendix C Tolerances on pitch and angle in relation to tolerance on effective diameter

1. Effect of pitch errors

An error in pitch virtually increases the effective diameter of a bolt and decreases the effective diameter of a nut.

If δp represents the maximum error in the axial displacement between any two points on a Whitworth form screw thread within the length of engagement, the corresponding virtual increase (decrease) in the effective diameter of the thread in the case of a bolt (nut) is given by the expression:

Virtual change in Eff. Dia. = $1.921 \times \delta p$

2. Effects of errors in angle

An error in one or both of the flank angles virtually increases the effective diameter of a bolt and decreases the effective diameter of a nut.

If $\delta\ a_1$ and $\delta\ a_2$ represent the errors present in the two flank angles of a Whitworth form screw thread, the corresponding virtual increase (decrease) in the effective diameter of the thread in the case of a bolt (nut) is given by the following expression:

Virtual change in Eff. Dia. = $0.0105 \times p \times (\delta\ a_1 + \delta\ a_2)$

where p = basic pitch of thread

$(\delta\ a_1 + \delta\ a_2)$ = sum of errors of the opposite flank angles in degrees *regardless of their signs*.

3. Criterion of acceptability of a combination of errors in the effective diameter, pitch and angle of a screw thread

a) *Bolts*. The simple effective diameter of a bolt (as measured along the pitch line of the thread) should lie between the limits specified for that diameter. In addition, the virtual effective diameter (i.e. the sum of the simple effective diameter and the effective diameter equivalent of the errors present in the pitch and flank angles of the bolt) should not exceed the upper limit stated for the effective diameter.

b) *Nuts*. The simple effective diameter of a nut (as measured along the pitch line) should lie between the limits specified for that diameter. In addition, the virtual effective diameter (i.e. the simple effective diameter after being reduced by the effective diameter equivalent of the errors present in the pitch and flank angles of the nut) should not be smaller than the lower limit stated for the effective diameter.

When a bolt or nut is inspected with a GO screw gauge made to the design sizes, and a NOT GO gauge for the effective diameter made to the lower limit for the effective diameter of the bolt or the upper limit of the nut, the above conditions as regards the size of the simple effective diameter, and its size as influenced by any errors present in the pitch and flank angles of the thread are safeguarded for practical purposes.

Ideally NOT GO effective diameter gauges should control only the simple effective diameter, and should not be influenced by irregularities of thread form. As ordinarily made however, they necessarily have flanks of definite length and, therefore, do not strictly control the simple effective diameter of the product thread within the minimum metal limits unless the flank angles of the product thread are correct. Such gauges will pass product threads with incorrect flank angles, the simple effective diameters of which can be outside the minimum metal limits by an amount proportional to the flank angle errors and the length of the flank of the NOT GO gauge.

Flank angle errors and irregularities of thread form do not necessarily render a product thread unserviceable, but it follows that it is important to supplement the use of such NOT GO effective diameter gauges by some independent check that the form of the product thread is reasonably correct. This check can be made by supervising the thread form of the taps and other threading tools and also by examination of samples of the product thread.

The normal method of inspecting screw threads is by the use of the limit gauges described above. The effective diameter limits of the work are given mainly in order to provide a basis for dimensioning the gauges. Only in cases where it is impracticable to use gauges for economic or other reasons, should direct measurement of the effective diameter by the two or three wire system be employed, and then only in conjunction with an examination of the thread form by optical projection against a master profile in order to check the flank angles and thread form; the pitch errors of the screw threads must also be measured. In such cases the results must be interpreted with care, as any surface irregularities, lack of uniformity of diameter, and errors of pitch and flank angles of the screw threads which are present make it very difficult to obtain a reliable estimate of the size of the virtual effective diameter.

It is not possible to lay down definite tolerances for the pitch or the flank angles of a screw thread of any particular size or class. In any particular case, the maximum permissible combined effects of pitch and angle errors will depend upon the difference between the simple effective diameter of the bolt or nut and the maximum metal limit of the effective diameter. In the case of a bolt having its simple effective diameter on the upper limit, no errors at all can be allowed in pitch or angle. The combined effect of the errors in pitch and angle can only attain a maximum value when the simple effective diameter of a bolt is on its lower limit or when the simple effective diameter of a nut is on the upper limit specified.

It is important to realize, therefore, that the tolerance allowed on the effective diameter should not be regarded as being available in full for variations in that element of the thread alone; part of this tolerance should be considered as reserved for compensating for the effects of errors in pitch and flank angle which are invariably present to some extent.

Appendix D Notes on the form of the crests of Whitworth threads

It is not necessary for the crests of Whitworth threads to have a perfect radiused form. Providing the crests fall within the tolerance zones defined in Figure 3, Figure 4 and Figure 5 their exact shape is not critical.

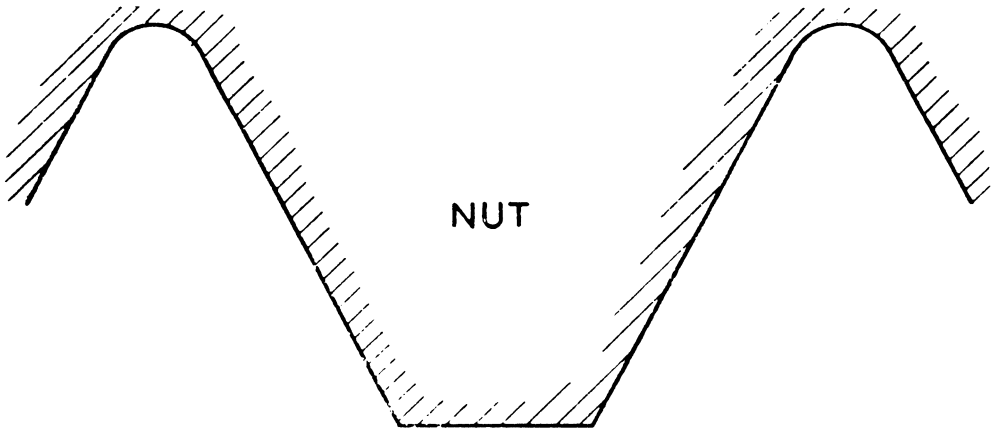
Typical crest forms obtained in the commercial manufacture of nuts and bolts are shown in Figure 8. These depart from the theoretical concept of the true radiused crest but are acceptable providing that the crest diameters (major diameter of bolt, minor diameter of nut) fall within the specified limits of size.

Nuts. With the object of easing the tapping operation and obtaining the maximum life from screwing taps the recommended tapping drill sizes given in BS 1157[6)] are the largest standard sizes of drill which will produce holes of sizes towards the upper limit of the relevant nut minor diameter. As a consequence the use of such drills results in flat crested threads, as illustrated in Figure 8 (a).

Bolts. A typical form of crest produced by the thread rolling process is shown in Figure 8 (b).

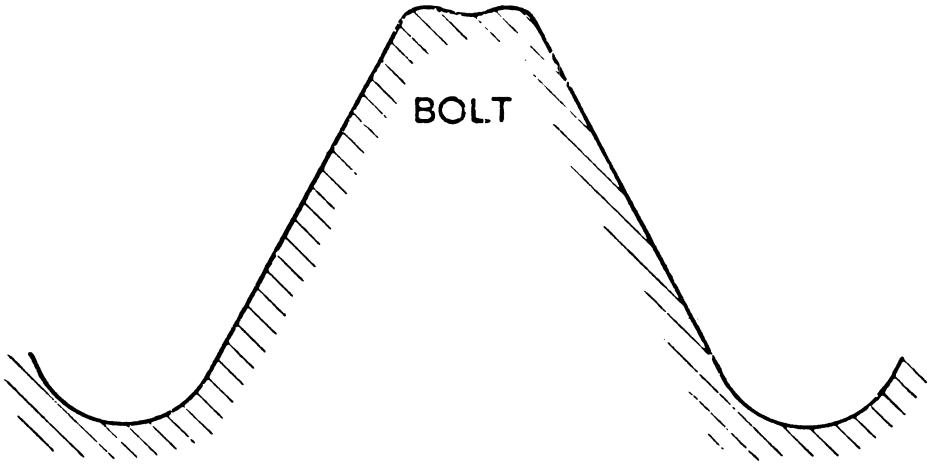
Figure 8 (c) shows a typical form of crest produced by a thread cutting die.

6) BS 1157, "*Tapping drill sizes*".



(a) TYPICAL CREST ON TAPPED NUT

(b) TYPICAL CREST ON ROLLED BOLT



(c) TYPICAL CREST ON CUT THREAD BOLT

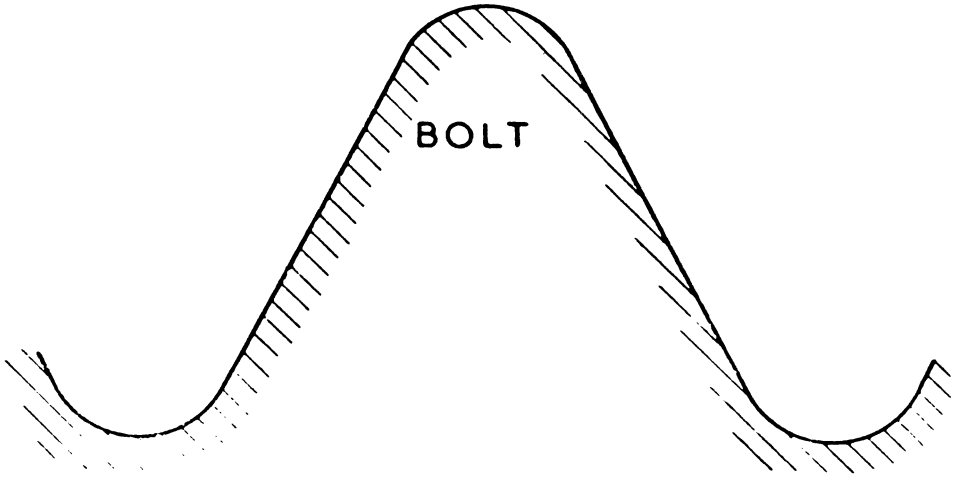


Figure 8 — Crest forms resulting from different production methods

Appendix E

Coarse thread series, B.S.W.

Table 24 — Nuts — Close class

Limits and Tolerances

1	2	3	4	5	6	7	8	9
Nominal size	Number of threads per inch	Major diameter	Effective diameter			Minor diameter		
		Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.
1/8 [a]	40	0.1250	0.1109	0.0019	0.1090	0.1020	0.0090	0.0930
3/16	24	0.1875	0.1631	0.0023	0.1608	0.1474	0.0133	0.1341
1/4	20	0.2500	0.2206	0.0026	0.2180	0.2030	0.0170	0.1860
5/16	18	0.3125	0.2797	0.0028	0.2769	0.2594	0.0181	0.2413
3/8	16	0.3750	0.3380	0.0030	0.3350	0.3145	0.0195	0.2950
7/16	14	0.4375	0.3950	0.0032	0.3918	0.3674	0.0213	0.3461
1/2	12	0.5000	0.4500	0.0034	0.4466	0.4169	0.0237	0.3932
9/16 [a]	12	0.5625	0.5127	0.0036	0.5091	0.4794	0.0237	0.4557
5/8	11	0.6250	0.5705	0.0037	0.5668	0.5338	0.0252	0.5086
11/16 [a]	11	0.6875	0.6331	0.0038	0.6293	0.5963	0.0252	0.5711
3/4	10	0.7500	0.6900	0.0040	0.6860	0.6490	0.0270	0.6220
7/8	9	0.8750	0.8082	0.0043	0.8039	0.7620	0.0292	0.7328
1	8	1.0000	0.9245	0.0045	0.9200	0.8720	0.0320	0.8400
1 1/8	7	1.1250	1.0383	0.0048	1.0335	0.9776	0.0356	0.9420
1 1/4	7	1.2500	1.1634	0.0049	1.1585	1.1026	0.0356	1.0670
1 1/2	6	1.5000	1.3986	0.0053	1.3933	1.3269	0.0403	1.2866
1 3/4	5	1.7500	1.6276	0.0057	1.6219	1.5408	0.0470	1.4938
2	4.5	2.0000	1.8638	0.0061	1.8577	1.7668	0.0514	1.7154
2 1/4	4	2.2500	2.0963	0.0064	2.0899	1.9868	0.0570	1.9298
2 1/2	4	2.5000	2.3465	0.0066	2.3399	2.2368	0.0570	2.1798
2 3/4	3.5	2.7500	2.5740	0.0070	2.5670	2.4481	0.0641	2.3840
3	3.5	3.0000	2.8242	0.0072	2.8170	2.6981	0.0641	2.6340
3 1/4 [a]	3.25	3.2500	3.0604	0.0074	3.0530	2.9245	0.0685	2.8560
3 1/2	3.25	3.5000	3.3106	0.0076	3.3030	3.1745	0.0685	3.1060
3 3/4 [a]	3	3.7500	3.5445	0.0079	3.5366	3.3969	0.0737	3.3232
4	3	4.0000	3.7946	0.0080	3.7866	3.6469	0.0737	3.5732
4 1/2	2.875	4.5000	4.2857	0.0084	4.2773	4.1312	0.0766	4.0546
5	2.75	5.0000	4.7760	0.0088	4.7672	4.6141	0.0797	4.5344
5 1/2	2.625	5.5000	5.2652	0.0091	5.2561	5.0954	0.0832	5.0122
6	2.5	6.0000	5.7533	0.0094	5.7439	5.5748	0.0870	5.4878

[a] To be dispensed with wherever possible.

Coarse fine thread series, B.S.F.

Table 25 — Nuts — Close class

Limits and Tolerances

1	2	3	4	5	6	7	8	9
Nominal size	Number of threads per inch	Major diameter	Effective diameter			Minor diameter		
		Min.	Max.	Tol.	Min.	Max.	Tol.	Min.
in.		in.	in.	in.	in.	in.	in.	in.
3/16 [a]	32	0.1875	0.1697	0.0022	0.1675	0.1577	0.0102	0.1475
7/32 [a]	28	0.2188	0.1983	0.0024	0.1959	0.1841	0.0111	0.1730
1/4	26	0.2500	0.2279	0.0025	0.2254	0.2125	0.0117	0.2008
9/32 [a]	26	0.2812	0.2592	0.0026	0.2566	0.2437	0.0117	0.2320
5/16	22	0.3125	0.2861	0.0027	0.2834	0.2684	0.0141	0.2543
3/8	20	0.3750	0.3459	0.0029	0.3430	0.3280	0.0170	0.3110
7/16	18	0.4375	0.4050	0.0031	0.4019	0.3844	0.0181	0.3663
1/2	16	0.5000	0.4633	0.0033	0.4600	0.4395	0.0195	0.4200
9/16	16	0.5625	0.5259	0.0034	0.5225	0.5020	0.0195	0.4825
5/8	14	0.6250	0.5829	0.0036	0.5793	0.5549	0.0213	0.5336
11/16 [a]	14	0.6875	0.6455	0.0037	0.6418	0.6174	0.0213	0.5961
3/4	12	0.7500	0.7005	0.0039	0.6966	0.6669	0.0237	0.6432
7/8	11	0.8750	0.8210	0.0042	0.8168	0.7838	0.0252	0.7586
1	10	1.0000	0.9404	0.0044	0.9360	0.8990	0.0270	0.8720
1 1/8	9	1.1250	1.0585	0.0046	1.0539	1.0120	0.0292	0.9828
1 1/4	9	1.2500	1.1837	0.0048	1.1789	1.1370	0.0292	1.1078
1 3/8 [a]	8	1.3750	1.3000	0.0050	1.2950	1.2470	0.0320	1.2150
1 1/2	8	1.5000	1.4252	0.0052	1.4200	1.3720	0.0320	1.3400
1 5/8 [a]	8	1.6250	1.5503	0.0053	1.5450	1.4970	0.0320	1.4650
1 3/4	7	1.7500	1.6640	0.0055	1.6585	1.6026	0.0356	1.5670
2	7	2.0000	1.9143	0.0058	1.9085	1.8526	0.0356	1.8170
2 1/4	6	2.2500	2.1494	0.0061	2.1433	2.0769	0.0403	2.0366
2 1/2	6	2.5000	2.3996	0.0063	2.3933	2.3269	0.0403	2.2866
2 3/4	6	2.7500	2.6498	0.0065	2.6433	2.5769	0.0403	2.5366
3	5	3.0000	2.8788	0.0069	2.8719	2.7908	0.0470	2.7438

[a] To be dispensed with wherever possible.

[b] The use of 2 B.A. threads is recommended in place of 3/16 in. B.S.F.

Selected and non-standard threads

Table 26 — Nuts — Close class

Tolerances

Diameters in inches

Unit of tolerance = 0.001 in.

Number of threads per in.[a]	Tolerances on effective diameter													Tolerance on minor diameter
	Basic major diameter above		1/8	1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	Total tolerance
	Basic major diameter up to and including		1/4	1/2	3/4	1 1/4	2	3	4	6	8	11	15	20	
40, 36			2.4	2.6	2.8	3.0	3.2								9.6
32, 28			2.5	2.7	2.9	3.1	3.3								11.1
26, 24			2.8	3.0	3.1	3.3	3.6	3.8							13.3
20				3.0	3.2	3.4	3.6	3.9							17.0
18, 16				3.4	3.6	3.7	4.0	4.2	4.4	4.7					19.5
14, 12					4.0	4.2	4.4	4.6	4.9	5.1					23.7
11, 10						4.3	4.5	4.7	4.9	5.2	5.5				27.0
8						4.7	5.0	5.2	5.4	5.7	6.0	6.2			32.0
6							5.6	5.8	6.0	6.3	6.6	6.8	7.1		40.3
4								6.6	6.9	7.1	7.4	7.7	8.0	8.3	57.0

[a] The numbers of t.p.i. in heavy type are to be preferred.

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