



BS 949 : Part 2 : 1979

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Specification for **Screwing taps**

Part 2. Taps for Unified threads (and for the obsolescent threads of Whitworth and BA forms)

Spécification des tarauds de filetage
Partie 2. Tarauds pour filetages UN (et pour les filetages Whitworth et BA
qui sont en train d'être retirés)

Spezifikation für Innengewinde
Teil 2. Innengewinde für UN-Gewinde (und für die veralteten
Whitworth- und BA-Gewinde)

Contents

	Page		Page
Foreword	2	Tables	
Cooperating organizations	Back cover	1. Summary of the sizes of each type and pattern of tap for Unified threads that are specified in tables 2, 3, 4 and 6	7
Specification		2. General dimensions of certain sizes of short machine or hand taps for Unified threads with nominal diameters over 0.9 mm and up to and including 2.8 mm	8
Section one. General		3. General dimensions of certain sizes of short machine or hand taps for Unified threads with nominal diameters over 2.8 mm and up to and including 10.0 mm	9
1. Scope	3	4. General dimensions of certain sizes of short machine or hand taps for Unified threads with nominal diameters over 10.0 mm	10
2. References	3	5. Summary of general dimensions of short machine or hand taps	11
3. Right-hand and left-hand threads	3	6. General dimensions of certain sizes of long shank machine taps for Unified threads	12
Section two. Nomenclature		7. Dimensional tolerances on shanks and squares of ground-thread taps	13
4. General dimension terminology	3	8. Dimensional tolerances on lengths of thread and overall lengths of all taps	13
5. Terminology of thread profiles	3	9. Dimensions and manufacturing tolerances for the threaded portion: UNC taps, class 1	15
6. Cutting feature terminology	3	10. Dimensions and manufacturing tolerances for the threaded portion: UNC taps, class 2	16
Section three. Types, patterns and size ranges of taps		11. Dimensions and manufacturing tolerances for the threaded portion: UNC taps, class 3	17
7. Types of tap	7	12. Dimensions and manufacturing tolerances for the threaded portion: UNF taps, class 1	18
8. Patterns of tap and size ranges	7	13. Dimensions and manufacturing tolerances for the threaded portion: UNF taps, class 2	19
Section four. General dimensions		14. Dimensions and manufacturing tolerances for the threaded portion: UNF taps, class 3	20
9. General dimensions of short machine or hand taps	8	15. Calculation of the dimensions of a ground-thread $\frac{5}{8}$ - 11 UNC tap, class 2	21
10. General dimensions of long shank machine taps	8	16. Formulae for limits of tolerance for ground-thread taps for Unified threads	23
11. General dimensions common to all types of tap	8	17. Tolerances on cumulative pitch for ground-thread taps for Unified threads	24
Section five. Tolerance classes of taps		18. Tolerances on thread angle of taps for Unified threads	24
12. Designations of classes	13	19. Tabulated values of elements based on pitch in basic formulae for taps for Unified threads	25
13. The difference in the classes	13	20. Tabulated values of elements based on nominal diameter in basic formulae for taps for Unified threads	26
14. Choice of tap tolerance class	13	21. Tabulated values of elements used in calculating the minor diameter from a measured value of the pitch diameter of a tap for Unified threads	27
Section six. Dimensions and manufacturing tolerances of the threaded portion		22. General dimensions of short machine or hand taps for Unified threads with reduced diameter shanks in the size range 3 mm to 10 mm (non-preferred)	28
15. Tap major diameter	14	23. Dimensional tolerances on shanks and squares of cut-thread taps	30
16. Tap pitch diameter	14	24. Dimensions and manufacturing tolerances for the threaded portion: UNC cut-thread taps	31
17. Tap minor diameter	14		
18. Thread angle	14		
19. Cumulative pitch error	14		
Section seven. Marking			
20. Method of marking	14		
21. Marks indicating the thread detail of the tap	14		
22. Marks indicating the material of the tap	14		
Appendices			
A. Example of calculation of the dimensions of the threaded portion of a tap	21		
B. Bases of calculation of the tolerances on the threaded portion of taps for Unified threads	22		
C. Short machine or hand taps with reduced diameter shanks in the size range 3 mm to 10 mm (non-preferred)	27		
D. Alternative forms of crests of taps	29		
E. Cut-thread taps	30		
F. Taps for BSW, BSF and BA threads (obsolescent)	32		
G. Summary of tap blank sizes and associated thread sizes	41		

	Page		Page
25. Dimensions and manufacturing tolerances for the threaded portion: UNF cut-thread taps	32	40. Summary of sizes of taps blanks and associated thread sizes, long shank machine taps	44
26. Dimensions and manufacturing tolerances for the threaded portion: BSW taps, class 2	33		
27. Dimensions and manufacturing tolerances for the threaded portion: BSW taps, class 3	34	Figures	
28. Dimensions and manufacturing tolerances for the threaded portion: BSW cut-thread taps	35	1. General dimension terminology of taps	3
29. Dimensions and manufacturing tolerances for the threaded portion: BSF taps, class 2	36	2. Taps for different purposes	4
30. Dimensions and manufacturing tolerances for the threaded portion: BSF taps, class 3	37	3. Thread profile of a nut	5
31. Dimensions and manufacturing tolerances for the threaded portion: BSF cut-thread taps	38	4. Thread profile of a tap	5
32. Dimensions and manufacturing tolerances for the threaded portion: BA taps, class 2	38	5. Cutting features of a tap	5
33. Dimensions and manufacturing tolerances for the threaded portion: BA cut-thread taps	39	6. Short machine or hand tap in the size range over 0.9 mm up to and including 2.8 mm (with full diameter shank and a tapered connecting portion between threaded portion and shank)	8
34. Formulae for limits of tolerance for taps for BSW, BSF and BA threads	39	7. Short machine or hand tap in the size range over 2.8 mm up to and including 10.0 mm (with full diameter shank and a neck between threaded portion and shank)	9
35. Tabulated values of elements based on pitch in basic formulae for BSW and BSF threads	40	8. Short machine or hand tap in the size range over 10.0 mm up to and including 101.6 mm (with reduced diameter shank)	10
36. Tabulated values of elements based on nominal diameter in basic formulae for BSW and BSF threads	40	9. Long shank machine tap	12
37. Tabulated values of elements used in calculating the minor diameter from a measured value of the pitch diameter of a tap for a BSW or BSF thread	41	10. Relationship of tap classes to nut tolerances	13
38. Tabulated values of elements used in calculating the minor diameter from a measured value of the pitch diameter of a tap for a BA thread	41	11. Minimum value of tap major diameter d	22
39. Summary of sizes of tap blanks and associated thread sizes, short machine or hand taps, nominal diameters up to 26.5 mm	42	12. Tap minor diameter d_1	22
		13. Short machine or hand tap with reduced diameter shank in the size range 3 mm to 10 mm (non-preferred)	28
		14. Crest produced by grinding with a single-ribbed wheel	29
		15. Crest produced by grinding with a crushed multi-ribbed wheel	29
		16. Crest produced by a thread-rolling die	29
		17. Crest produced by a tap-cutting die	29

Foreword

This Part of this British Standard has been prepared under the direction of the Mechanical Engineering Standards Committee.

The first specification for screwing taps for Unified threads with the general dimensions expressed in millimetres to be included in BS 949 was contained in the 1969 edition, which also contained specifications for taps for ISO metric threads, for pipe threads and for British Standard Whitworth threads (BSW), British Standard Fine threads (BSF) and British Association threads (BA). The general dimensions of the short machine or hand taps were based on ISO/R 529.

So far as the general dimensions of short machine or hand taps are concerned, this Part of this British Standard is again in conformity with International Standard ISO 529 (which has superseded ISO/R 529), except that the taps with reduced diameter shanks and nominal diameters from 3 mm to 10 mm that were specified in Addendum No. 1 to ISO/R 529 (and are included in ISO 529) are not recommended for use in the United Kingdom (it is not thought necessary to have alternative patterns of short machine or hand taps in any part of the size range). However, these alternative taps may be mentioned in international discussions and so that their dimensions may be known they are given in appendix C.

The 'nut taps' that were specified in previous editions of this British Standard are not now included since the machines for the mass production of nuts are so specialized that there is no longer any need for a standard range of nut taps. With the nut taps deleted, there is considered to be no sufficient reason for preferring a national version of a long reach tap to one that is internationally standardized. So far as the general dimensions of long shank machine taps are concerned, this Part of this British Standard is therefore in conformity with ISO 2283.

With the publication of ISO 2857, the International Organization for Standardization (ISO) has progressed to the specification of manufacturing tolerances for the threaded portion of ground-thread taps for ISO metric threads. However, the proposal to develop a corresponding

international standard for taps for Unified threads is not being proceeded with by the ISO subcommittee concerned. In these circumstances, the tolerance values specified in this Part of this British Standard are unchanged from those specified for taps for Unified threads in the 1969 edition (except that, as explained below, zones 1 and 2 have been combined).

However, the ISO class designations have been adopted for taps for Unified threads so that there shall be a common system of designating tap tolerance classes for all thread forms. In this system a class 1 tap is suitable for the production of a 3B threaded hole, a class 2 tap for a 2B threaded hole and a class 3 tap for a 1B threaded hole.

Class 1, 2 and 3 taps correspond to zone 1, 2, 3 and 4 taps (as specified in the 1969 edition of this British Standard) as follows (see figure 10):

- class 1: zones 1 and 2 together
- class 2: zone 3
- class 3: zone 4

In the case of taps other than those with ground threads (i.e. cut-thread taps), the tolerance values are unchanged from those specified in the 1969 edition of this British Standard. The designation 'zone 5' is, however, not being retained as it would be confusing to have classes 1, 2 and 3 and zone 5; these taps are now designated 'cut-thread taps' and information concerning them is given in appendix E.

To simplify the method of designating tap classes, the class designations are also being applied to taps for BSW, BSF and BA threads and information concerning them is given in appendix F.

This revision of this British Standard is issued in Parts, the other Parts being:

- Part 1 Taps for ISO metric threads
- Part 3 Taps for pipe threads*

Together with Part 3, this Part of this British Standard supersedes those contents of BS 949 : 1969 (now retitled BS 949 : Part 4 : 1969) that have not been superseded by Part 1.

* In course of preparation.

British Standard Specification for

Screwing taps

Part 2. Taps for Unified threads (and for the obsolescent threads of Whitworth and BA forms)

Section one. General

1. Scope

1.1 This Part of this British Standard specifies dimensions and tolerances for screwing taps for the following threads:

- (a) Unified (ISO inch) general-purpose screw threads, coarse thread series (UNC), from no. 1 to no. 12 and from $\frac{1}{4}$ in to 4 in diameter in accordance with BS 1580 : Parts 1, 2 and 3;
- (b) Unified (ISO inch) general-purpose screw threads, fine thread series (UNF), from no. 0 to no. 12 and from $\frac{1}{4}$ in to $1\frac{1}{2}$ in diameter also in accordance with BS 1580 : Parts 1, 2 and 3;
- (c) in appendix F, British Standard Whitworth (BSW) threads from $\frac{1}{8}$ in to 4 in diameter and British Standard Fine (BSF) threads from $\frac{3}{16}$ in to 3 in diameter in accordance with BS 84;
- (d) also in appendix F, British Association (BA) threads from no. 14 to no. 0 in accordance with BS 93.

1.2 This Part of this British Standard also provides information from which may be calculated the dimensions and tolerances of taps for the extra fine thread series (UNEF) and the constant-pitch series (UN).

2. References

The titles of the standards publications referred to in this Part of this British Standard are listed on the inside back cover.

3. Right-hand and left-hand threads

This Part of this British Standard relates to taps for right-hand threads unless otherwise stated (see 21.4). Any reference to taps in connection with this Part of this British Standard shall be assumed to relate to taps for right-hand threads unless taps for left-hand threads are specified.

Section two. Nomenclature

4. General dimension terminology

4.1 The general dimension terminology of taps is illustrated in figure 1.

4.2 The nominal diameter of a tap is the nominal major diameter of the tapped hole that it is to cut.

4.3 For the purposes of this Part of this British Standard, taps are designated 'taper taps', 'second taps' and 'bottoming taps'. These terms and other terminology associated with taps for different purposes are illustrated in figure 2.

NOTE 1. For the differences between taper, second and bottoming taps, see 11.3.

NOTE 2. The term 'plug tap' has been used in the United Kingdom with the meaning 'bottoming tap', but it has been used in the USA with the meaning 'second tap'. In order to avoid confusion, agreement has been reached in the ISO subcommittee concerned with taps and dies that use of the term 'plug tap' should be strongly deprecated in both countries.

5. Terminology of thread profiles

5.1 The internal threads produced with the taps specified in this Part of this British Standard are conventionally designated by the simplified denomination 'nut'. The thread profile of a nut and the method of its dimensioning and tolerancing are shown in figure 3.

5.2 The method of dimensioning and tolerancing the thread profile of a tap is illustrated in figure 4.

6. Cutting feature terminology

The terminology associated with the cutting features of a tap is illustrated in figure 5.

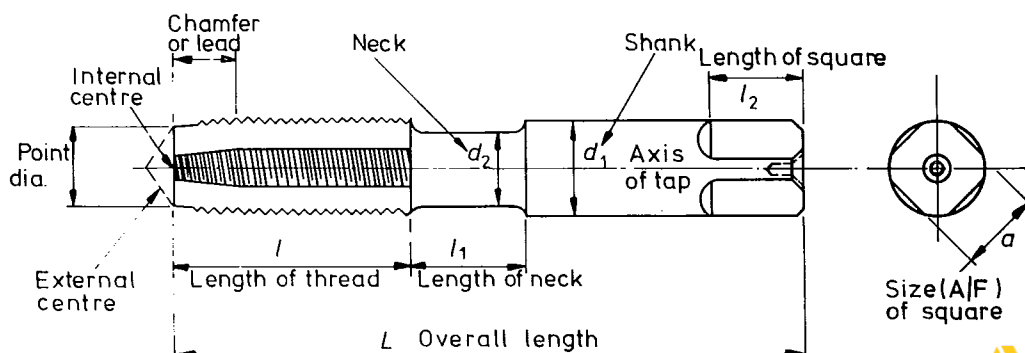


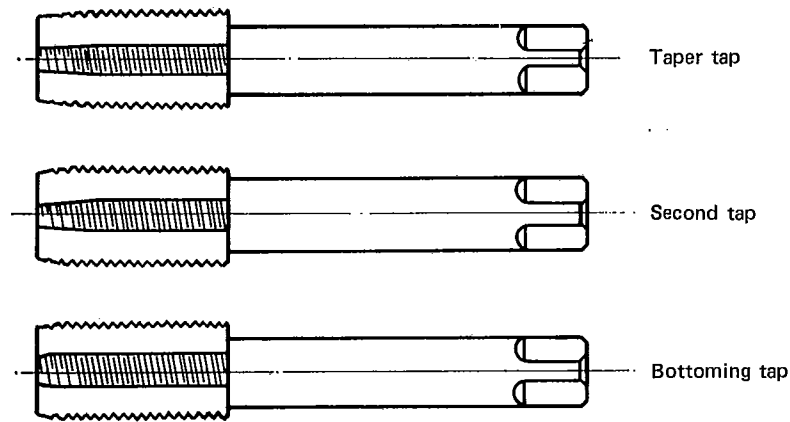
Figure 1. General dimension terminology of taps (the tap illustrated is the pattern shown in figure 7)



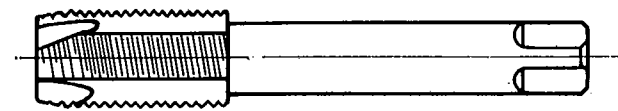
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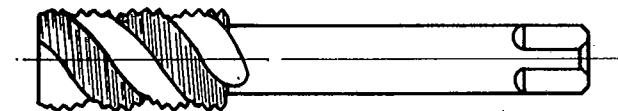
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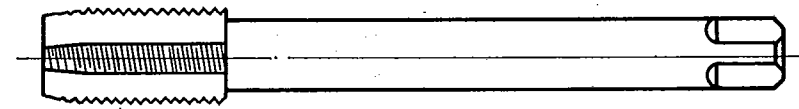
(a) Set of three short machine or hand taps (see 4.3)



(b) Short machine tap with straight flutes and spiral point, primarily for directing swarf forward of tap, illustrated with internal centres



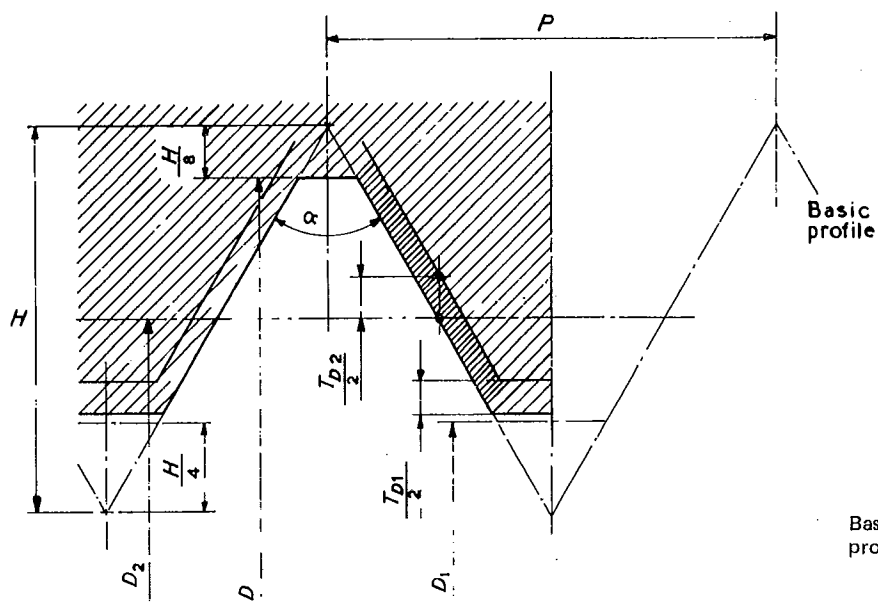
(c) Short machine tap with right-hand spiral flutes, primarily for directing swarf towards the rear of the tap



(d) Long shank machine tap (for long reach purposes) shown with second lead

NOTE. Each illustration shows a UNC $\frac{3}{4}$ — 10 tap to the same scale.

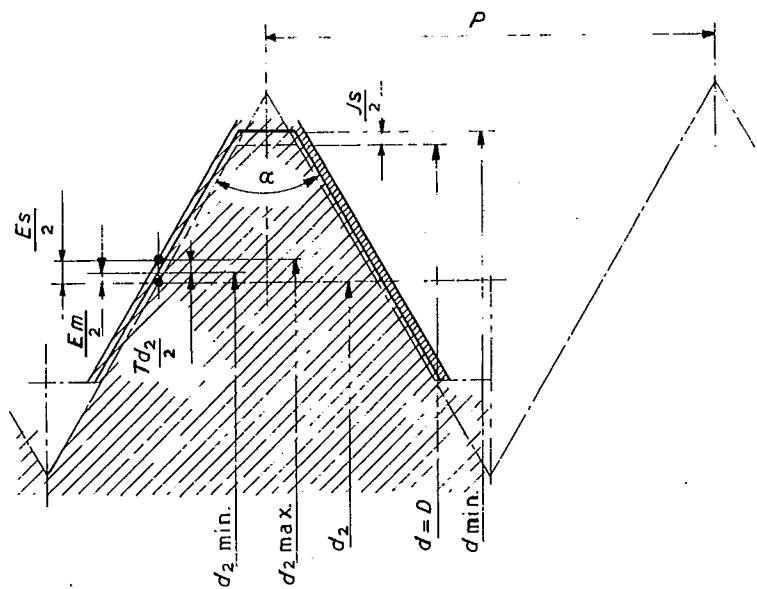
Figure 2. Taps for different purposes



Basic profile { D is the diameter
 D_1 is the basic minor diameter
 D_2 is the pitch diameter
 P is the pitch of thread
 α is the included angle of thread
 H is the height of fundamental triangle

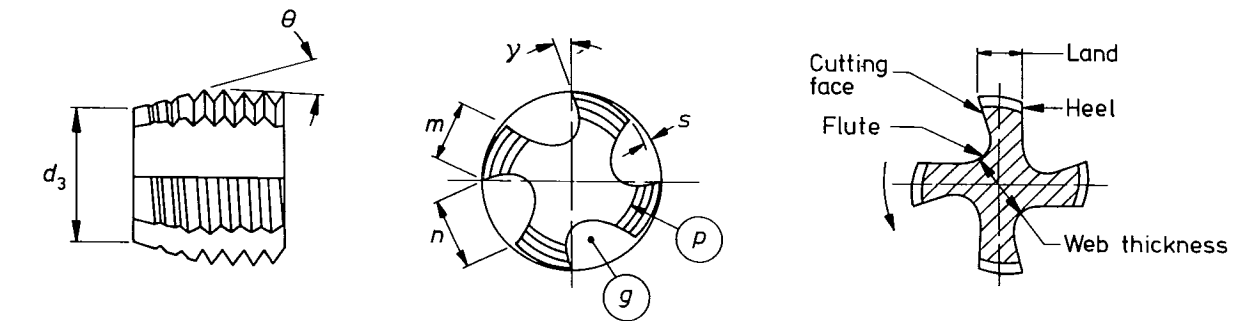
Figure 3. Thread profile of a nut

T_{D_1} is the minor diameter tolerance
 T_{D_2} is the pitch diameter tolerance

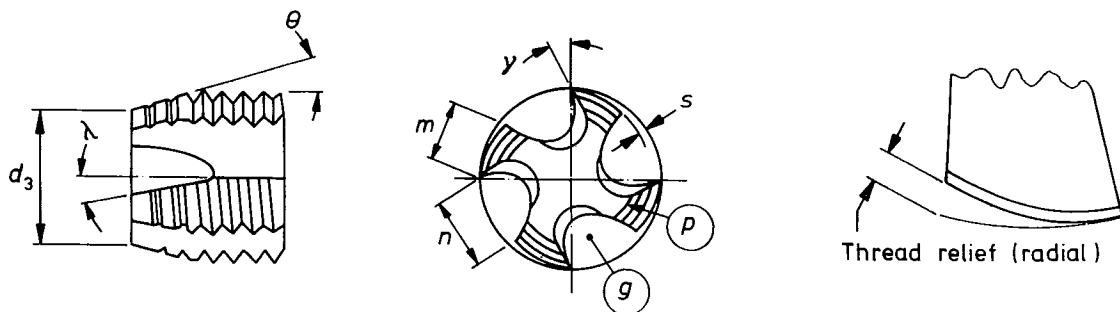


$d = D$ nominal diameters
 d_{min} is the permissible minimum major diameter
 J_s is the minimum clearance on major diameter
 $d_2 = D_2$ pitch diameters
 $d_{2,min}$ is the minimum pitch diameter
 $d_{2,max}$ is the maximum pitch diameter
 E_s is the upper deviation of pitch diameter
 E_m is the lower deviation of pitch diameter
 T_{d_2} is the tolerance on pitch diameter

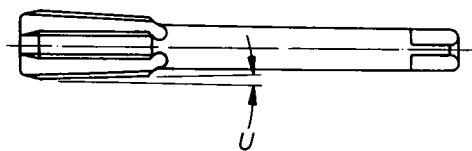
Figure 4. Thread profile of a tap



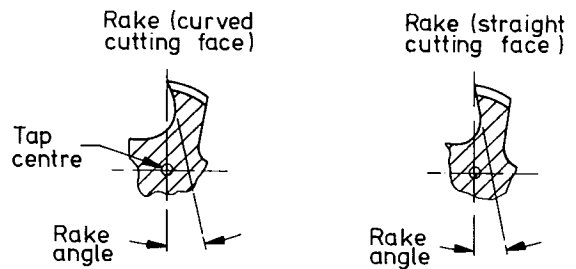
Without spiral point



With spiral point



(Back taper exaggerated)



- g Flute
- n Width of flute
- p Land
- m Width of land
- γ Rake angle
- d_3 Point diameter
- θ Chamfer angle (or lead angle)
- λ Spiral point angle
- s Radial thread relief (rate expressed in μm per mm of width of land)
- U Back taper (axial relief) (rate expressed in % of thread length)

Figure 5. Cutting features of a tap

Section three. Types, patterns and size ranges of taps

7. Types of tap

Two types of taps for Unified threads are specified in this Part of this British Standard, namely short machine or hand taps and long shank machine taps (these latter are in lieu of nut taps, see the foreword).

8. Patterns of tap and size ranges

8.1 The short machine or hand taps are specified in three patterns that differ in the shank of the tap, not in the threaded portion. The three patterns are:

- (a) taps in the size range over 0.9 mm and up to 2.8 mm which have a full diameter shank and a tapered connecting portion between the threaded portion and the shank (see figure 6);
- (b) taps in the size range over 2.8 mm and up to 10.0 mm which have a full diameter shank and a neck

between the threaded portion and the shank (see figure 7);

(c) taps in the size range over 10.0 mm and up to 101.6 mm which have a reduced diameter shank (see figure 8).

8.2 The long shank machine tap for Unified threads (size range over 2.8 mm and up to 26.5 mm) is also a tap with a reduced diameter shank (see figure 9), but for a given size of tap the shank length is greater than that of the short tap (see 10.2).

8.3 The sizes of each type and pattern of tap for Unified threads that are directly specified in tables 2, 3, 4 and 6 are shown in table 1.

NOTE 1. The sizes of taps shown in table 1 are not necessarily all first preference sizes. For the selection of preferred thread sizes, see BS 1580 : Parts 1 and 2 and Part 3.

NOTE 2. For taps with reduced diameter shanks in the size range for which taps with full diameter shanks and neck are specified, see the foreword and appendix C.

Table 1. Summary of the sizes of each type and pattern of tap for Unified threads that are specified in tables 2, 3, 4 and 6

1	2	3	4
Short machine or hand taps		Long shank machine taps	
Coarse thread series (UNC)	Fine thread series (UNF)	Coarse thread series (UNC)	Fine thread series (UNF)
No. 1 – 64 No. 2 – 56 No. 3 – 48	No. 0 – 80 No. 1 – 72 No. 2 – 64 No. 3 – 56		
No. 4 – 40 No. 5 – 40 No. 6 – 32 No. 8 – 32 No. 10 – 24 No. 12 – 24 $\frac{1}{4}$ – 20 $\frac{5}{16}$ – 18 $\frac{3}{8}$ – 16	No. 4 – 48 No. 5 – 44 No. 6 – 40 No. 8 – 36 No. 10 – 32 No. 12 – 38 $\frac{1}{4}$ – 28 $\frac{5}{16}$ – 24 $\frac{3}{8}$ – 24	No. 5 – 40 No. 6 – 32 No. 8 – 32 No. 10 – 24 No. 12 – 24 $\frac{1}{4}$ – 20 $\frac{5}{16}$ – 18 $\frac{3}{8}$ – 16	No. 5 – 44 No. 6 – 40 No. 8 – 36 No. 10 – 32 No. 12 – 28 $\frac{1}{4}$ – 28 $\frac{5}{16}$ – 24 $\frac{3}{8}$ – 24
$\frac{7}{16}$ – 14 $\frac{1}{2}$ – 13 $\frac{9}{16}$ – 12 $\frac{5}{8}$ – 11 $\frac{3}{4}$ – 10 $\frac{7}{8}$ – 9 1 – 8	$\frac{7}{16}$ – 20 $\frac{1}{2}$ – 20 $\frac{9}{16}$ – 18 $\frac{5}{8}$ – 18 $\frac{3}{4}$ – 16 $\frac{7}{8}$ – 14 1 – 12	$\frac{7}{16}$ – 14 $\frac{1}{2}$ – 13 $\frac{9}{16}$ – 12 $\frac{5}{8}$ – 11 $\frac{3}{4}$ – 10 $\frac{7}{8}$ – 9 1 – 8	$\frac{7}{16}$ – 20 $\frac{1}{2}$ – 20 $\frac{9}{16}$ – 18 $\frac{5}{8}$ – 18 $\frac{3}{4}$ – 16 $\frac{7}{8}$ – 14 1 – 12
$1\frac{1}{8}$ – 7 $1\frac{1}{4}$ – 7 $1\frac{3}{8}$ – 6 $1\frac{1}{2}$ – 6 $1\frac{3}{4}$ – 5 2 – $4\frac{1}{2}$ $2\frac{1}{4}$ – $4\frac{1}{2}$ $2\frac{3}{4}$ – 4 3 – 4 $3\frac{1}{4}$ – 4 $3\frac{1}{2}$ – 4 $3\frac{3}{4}$ – 4 4 – 4	$1\frac{1}{8}$ – 12 $1\frac{1}{4}$ – 12 $1\frac{3}{8}$ – 12 $1\frac{1}{2}$ – 12		



Section four. General dimensions

9. General dimensions of short machine or hand taps

9.1 The general dimensions of the sizes of short machine or hand taps shown in table 1 shall be as shown in tables 2, 3 and 4*, and the tolerances on those dimensions shall be as shown in tables 7 and 8.

9.2 The general dimensions of other sizes of short machine or hand taps shall be as shown in table 5, and the tolerances on those dimensions shall be as shown in tables 7 and 8.

NOTE. For taps with reduced diameter shanks in the size range for which taps with full diameter shank and neck are specified, see appendix C.

10. General dimensions of long shank machine taps

10.1 The general dimensions of the sizes of long shank machine taps shown in table 1 shall be as shown in table 6, and the tolerances on those dimensions shall be as shown in tables 7 and 8.

10.2 The general dimensions of other sizes of long shank machine taps shall be as shown in table 26, and the tolerances on those dimensions shall be as shown in tables 7 and 8.

NOTE 1. For a given nominal diameter, the long shank machine taps for a coarse pitch series thread and for a fine pitch series thread have different thread lengths l , but in other respects their general dimensions are the same.

NOTE 2. Except for the thread length l of a tap for a fine pitch series thread, the general dimensions of long shank machine taps are derived from the general dimensions of the short machine or hand tap for a coarse pitch series thread of the same nominal diameter. The general dimensions of long shank machine taps are derived as follows.

(a) The shank diameter is equal to that of the same nominal size of short machine or hand tap with reduced diameter shank; compare tables 6 and 26 with tables 4, 5(c) and 22.

(b) The overall length is given by the expression $1.5 \times (L - l) + l$ where l and L are taken from columns 4 and 6 of table 5; if the value of $(L - l)$ is an odd number, the result is rounded down to the nearest millimetre.

(c) The thread length l is the same as the thread length of the short machine or hand tap for the same thread, i.e. as shown in columns 4 or 5 of table 5(b) and (c).

11. General dimensions common to all types of tap

11.1 For all the taps specified in this Part of this British Standard, the size and length of the driving square shall be related to the shank diameter as shown in table 5 (the relationship is in accordance with ISO 237).

11.2 The point diameter of a tap shall be approximately equal to the basic minor diameter of the thread to be cut.

11.3 The amount of the chamfer (or lead) of a tap shall be as follows:

taper tap	approximately 4° per side
second tap	approximately 8° per side
bottoming tap	approximately 23° per side.

NOTE. See note 2 to 4.3.

11.4 The larger sizes of taps are customarily manufactured with internal centres. The smaller sizes of taps are manufactured with internal centres or external centres at the manufacturer's discretion.

11.5 Ground thread taps may, but need not, have radial thread relief.

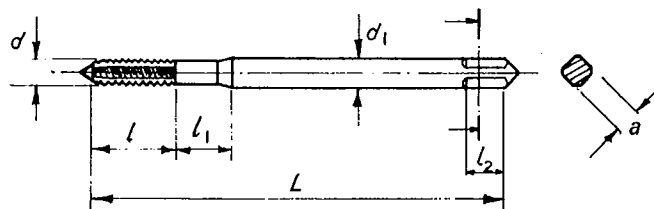


Figure 6. Short machine or hand tap in the size range over 0.9 mm and up to and including 2.8 mm (with full diameter shank and a tapered connecting portion between threaded portion and shank)

*The dimensions specified in tables 2, 3 and 4 are repeated in table 5.

Table 2. General dimensions of certain sizes of short machine or hand taps for Unified threads with nominal diameters over 0.9 mm and up to and including 2.8 mm (see figure 6)

Dimensions in millimetres.

1	2	3	4	5	6	7	8	9	10	11	12
Coarse thread series taps (UNC)			Fine thread series taps (UNF)			Shank diameter	Length of thread	Overall length	Length of tapered connecting portion	Driving square	
Thread designation	Nominal (basic major) diameter d	Approximate pitch p	Thread designation	Nominal (basic major) diameter d	Approximate pitch p					A/F	Length
						d_1	l	L	l_1	a	l_2
			No. 0 – 80	1.524	0.318	2.50	8.0	41.0	5.0	2.00	4
No. 1 – 64	1.854	0.397	No. 1 – 72	1.854	0.353	2.50	8.0	41.0	5.5	2.00	4
No. 2 – 56	2.184	0.454	No. 2 – 64	2.184	0.397	2.80	9.5	44.5	6.0	2.24	5
No. 3 – 48	2.515	0.529	No. 3 – 56	2.515	0.454						

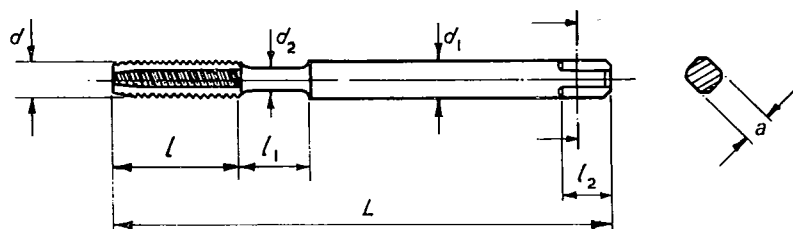


Figure 7. Short machine or hand tap in the size range over 2.8 mm up to and including 10.0 mm (with full diameter shank and a neck between threaded portion and shank)

Table 3. General dimensions of certain sizes of short machine or hand taps for Unified threads with nominal diameters over 2.8 mm and up to and including 10.0 mm (see figure 7)

Dimensions in millimetres.

1	2	3	4	5	6	7	8	9	10
Thread designation	Nominal (basic major) diameter d	Approximate pitch p	Shank diameter d_1	Length of thread l	Overall length L	Neck		Driving square	
						Minimum diameter d_2	Length l	A/F a	Length l_2

(a) Coarse thread series taps (UNC)

No. 4 – 40	2.845	0.635	3.15	11	48	2.12	7	2.50	5
No. 5 – 40	3.175		3.15	11	48	2.36	7	2.50	5
No. 6 – 32	3.505	0.794	3.55	13	50	2.50	7	2.80	5
No. 8 – 32	4.166		4.50	13	53	3.15	8	3.55	6
No. 10 – 24	4.826	1.058	5.00	16	58	3.55	9	4.00	7
No. 12 – 24	5.486		5.60	17	62	4.25	9	4.50	7
$\frac{1}{4}$ – 20	6.350	1.270	6.30	19	66	4.50	11	5.00	8
$\frac{3}{16}$ – 18	7.938	1.411	8.00	22	72	6.00	13	6.30	9
$\frac{3}{8}$ – 16	9.525	1.588	10.00	24	80	7.50	15	8.00	11

(b) Fine thread series taps (UNF)

No. 4 – 48	2.845	0.529	3.15	11	48	2.12	7	2.50	5
No. 5 – 44	3.175	0.577	3.15	11	48	2.36	7	2.50	5
No. 6 – 40	3.505	0.635	3.55	13	50	2.50	7	2.80	5
No. 8 – 36	4.166	0.706	4.50	13	53	3.15	8	3.55	6
No. 10 – 32	4.826	0.794	5.00	16	58	3.55	9	4.00	7
No. 12 – 28	5.486	0.907	5.60	17	62	4.25	9	4.50	7
$\frac{1}{4}$ – 28	6.350		6.30	19	66	4.50	11	5.00	8
$\frac{5}{16}$ – 24	7.938	1.058	8.00	19	69	6.00	13	6.30	9
$\frac{3}{8}$ – 24	9.525		10.00	20	76	7.50	15	8.00	11

NOTE. The fine thread series taps with thread designations from no. 4–48 up to and including $\frac{1}{4}$ –28 each have the same general dimensions as the coarse thread series tap with the same nominal diameter; see table 3(a).

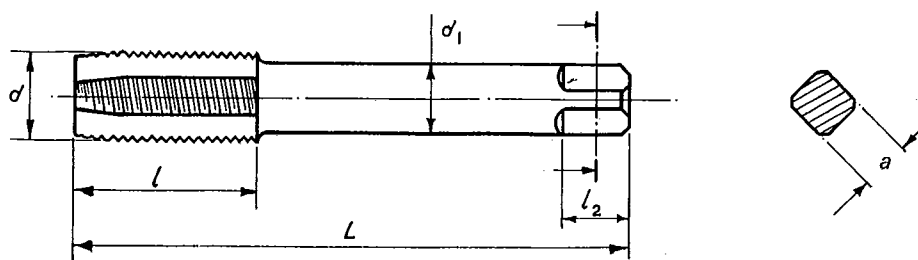


Figure 8. Short machine or hand tap in the size range over 10.0 mm up to and including 101.6 mm (with reduced diameter shank)

Table 4. General dimensions of certain sizes of short machine or hand taps for Unified threads with nominal diameters over 10.0 mm (see figure 8)

Dimensions in millimetres.

1	2	3	4	5	6	7	8
Thread designation	Nominal (basic major) diameter d	Approximate pitch p	Shank diameter d_1	Length of thread l	Overall length L	Driving square	
						A/F a	Length l_2

(a) Coarse thread series taps (UNC)

$\frac{7}{16} - 14$	11.112	1.814	8.0	25	85	6.3	9
$\frac{1}{2} - 13$	12.700	1.954	9.0	29	89	7.1	10
$\frac{9}{16} - 12$	14.288	2.117	11.2	30	95	9.0	12
$\frac{5}{8} - 11$	15.875	2.309	12.5	32	102	10.0	13
$\frac{3}{4} - 10$	19.050	2.540	14.0	37	112	11.2	14
$\frac{7}{8} - 9$	22.225	2.822	16.0	38	118	12.5	16
1 - 8	25.400	3.175	18.0	45	130	14.0	18
$1 \frac{1}{8} - 7$	28.575	3.629	20.0	48	138	16.0	20
$1 \frac{1}{4} - 7$	31.750		22.4	51	151	18.0	22
$1 \frac{3}{8} - 6$	34.925	4.233	25.0	57	162	20.0	24
$1 \frac{1}{2} - 6$	38.100		28.0	60	170	22.4	26
$1 \frac{3}{4} - 5$	44.450	5.080	31.5	67	187	25.0	28
2 - $4 \frac{1}{2}$	50.800	5.644	35.5	70	200	28.0	31
$2 \frac{1}{4} - 4 \frac{1}{2}$	57.150		40.0	76	221	31.5	34
$2 \frac{1}{2} - 4$	63.500	6.350	40.0	79	224	31.5	34
$2 \frac{3}{4} - 4$	69.850		45.0	79	234	35.5	38
3 - 4	76.200		50.0	83	258	40.0	42
$3 \frac{1}{4} - 4$	82.550		50.0	86	261	40.0	42
$3 \frac{1}{2} - 4$	88.900		56.0	89	279	45.0	46
$3 \frac{3}{4} - 4$	95.250						
4 - 4	101.600						

(b) Fine thread series taps (UNF)

$\frac{7}{16} - 20$	11.112	1.270	8.0	22	82	6.3	9
$\frac{1}{2} - 20$	12.700		9.0	24	84	7.1	10
$\frac{9}{16} - 18$	14.288	1.411	11.2	25	90	9.0	12
$\frac{5}{8} - 18$	15.875		12.5	25	95	10.0	13
$\frac{3}{4} - 16$	19.050	1.588	14.0	29	104	11.2	14
$\frac{7}{8} - 14$	22.225	1.814	16.0	33	113	12.5	16
1 - 12	25.400	2.117	18.0	35	120	14.0	18
$1 \frac{1}{8} - 12$	28.575		20.0	37	127	16.0	20
$1 \frac{1}{4} - 12$	31.750		22.4	37	137	18.0	22
$1 \frac{3}{8} - 12$	34.925		25.0	39	144	20.0	24
$1 \frac{1}{2} - 12$	38.100		28.0	39	149	22.4	26

Table 5. Summary of general dimensions of short machine or hand taps
Dimensions in millimetres.

1	2	3	4	5	6	7	8	9	10	11	12
Nominal (basic major) diameter		Shank diameter	Thread length*		Overall length*		Minimum neck diameter	Connecting length or neck length	Driving square		Fine pitch blank used for threads finer than
Over	Up to and including		Coarse thread series taps (UNC) <i>l</i>	Fine thread series taps (UNF) <i>l</i>	Coarse thread series taps (UNC) <i>L</i>	Fine thread series taps (UNF) <i>L</i>			A/F <i>a</i>	Length <i>l</i> ₂	
		<i>d</i> ₁					<i>d</i> ₂	<i>l</i> ₁			t.p.i.

(a) See table 2 and figure 6.

1.90	1.25	2.50	5.5		38.5			4.5	2.00	4	
1.25	1.40	2.50	7.0		40.0			5.0	2.00	4	
1.40	1.80	2.50	8.0		41.0			5.0	2.00	4	
1.80	2.00	2.50	8.0		41.0			5.5	2.00	4	
2.00	2.80	2.80	9.5		44.5			6.0	2.24	5	

(b) See table 3 and figure 7.

2.80	3.20	3.15	11		48		2.12	7.0	2.50	5	
3.20	3.60	3.55	13		50		2.50	7.0	2.80	5	
3.60	4.00	4.00	13		53		2.80	8.0	3.15	6	
4.00	4.50	4.50	13		53		3.15	8.0	3.55	6	
4.50	5.00	5.00	16		58		3.55	9.0	4.00	7	
5.00	5.60	5.60	17		62		4.25	9.0	4.50	7	
5.60	6.35	6.30	19		66		4.50	11.0	5.00	8	
6.35	7.20	7.10	19		66		5.30	11.0	5.60	8	
7.20	8.00	8.00	22	19	72	69	6.00	13.0	6.30	9	22
8.00	9.00	9.00	22	19	72	69	7.10	14.0	7.10	10	22
9.00	10.00	10.00	24	20	80	76	7.50	15.0	8.00	11	20

(c) See table 4 and figure 8.

10.00	10.60	7.10	24	22	84	82			5.60	8	18
10.60	11.80	8.00	25	22	85	82			6.30	9	18
11.80	13.20	9.00	29	24	89	84			7.10	10	16
13.20	15.00	11.20	30	25	95	90			9.00	12	16
15.00	17.00	12.50	32	25	102	95			10.00	13	16
17.00	21.20	14.00	37	29	112	104			11.20	14	14
21.20	23.60	16.00	38	33	118	113			12.50	16	13
23.60	26.50	18.00	45	35	130	120			14.00	18	11
26.50	28.00	20.00	45	37	135	127			16.00	20	11
28.00	30.00	20.00	48	37	138	127			16.00	20	11
30.00	33.50	22.40	51	37	151	137			18.00	22	11
33.50	37.50	25.00	57	39	162	144			20.00	24	11
37.50	42.50	28.00	60	39	170	149			22.40	26	11
42.50	50.00	31.50	67	45	187	165			25.00	28	9
50.00	56.00	35.50	70	45	200	175			28.00	31	9
56.00	63.00	40.00	76		221				31.50	34	
63.00	67.00	40.00	79		224				31.50	34	
67.00	75.00	45.00	79		234				35.50	38	
75.00	80.00	50.00	83		258				40.00	42	
80.00	90.00	50.00	86		261				40.00	42	
90.00	101.60	56.00	89		279				45.00	46	

* For taps of nominal diameter up to and including 7.20 mm, the same blank is used for the coarse thread series tap and for the fine thread series tap of a given nominal diameter. For taps of nominal diameter over 7.20 mm and up to and including 56.00 mm, the thread lengths *l* shown in column 5 and the overall lengths *L* shown in column 7 are used for fine thread series taps, i.e. for pitches finer than the value shown in column 12.

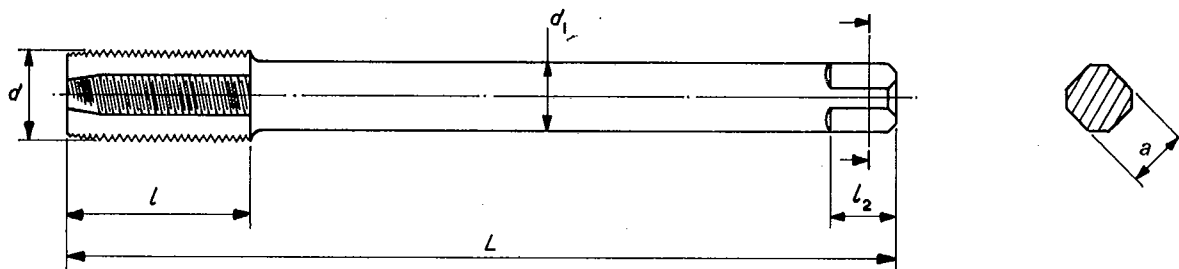


Figure 9. Long shank machine tap

Table 6. General dimensions of certain sizes of long shank machine taps for Unified threads (see figure 9)

Dimensions in millimetres

1	2	3	4	5	6	7	8
Thread designation	Nominal (basic major) diameter d	Approximate pitch p	Shank diameter d_1	Length of thread l	Overall length L	Driving square	
						A/F a	Length l_2

(a) Coarse thread series taps (UNC)

No. 5 – 40	3.175	0.635	2.24	11	66	1.80	4
No. 6 – 32	3.505	0.794	2.50	13	68	2.00	4
No. 8 – 32	4.166		3.15	13	73	2.50	5
No. 10 – 24	4.826	1.058	3.55	16	79	2.80	5
No. 12 – 24	5.486		4.00	17	84	3.15	6
$\frac{1}{4}$ – 20	6.350	1.270	4.50	19	89	3.55	6
$\frac{5}{16}$ – 18	7.938	1.411	6.30	22	97	5.00	8
$\frac{3}{8}$ – 16	9.525	1.588	7.10	24	108	5.60	8
$\frac{7}{16}$ – 14	11.112	1.814	8.00	25	115	6.30	9
$\frac{1}{2}$ – 13	12.700	1.954	9.00	29	119	7.10	10
$\frac{9}{16}$ – 12	14.288	2.117	11.20	30	127	9.00	12
$\frac{5}{8}$ – 11	15.875	2.309	12.50	32	137	10.00	13
$\frac{3}{4}$ – 10	19.050	2.540	14.00	37	149	11.20	14
$\frac{7}{8}$ – 9	22.225	2.822	16.00	38	158	12.50	16
1 – 8	25.400	3.175	18.00	45	172	14.00	18

(b) Fine thread series taps (UNF)

No. 5 – 44	3.175	0.577	2.24	11	66	1.80	4
No. 6 – 40	3.505	0.635	2.50	13	68	2.00	4
No. 8 – 36	4.166	0.706	3.15	13	73	2.50	5
No. 10 – 32	4.826	0.794	3.55	16	79	2.80	5
No. 12 – 28	5.486	0.907	4.00	17	84	3.15	6
$\frac{1}{4}$ – 28	6.350		4.50	19	89	3.55	6
$\frac{5}{16}$ – 24	7.938	1.058	6.30	19	97	5.00	8
$\frac{3}{8}$ – 24	9.525		7.10	20	108	5.60	8
$\frac{7}{16}$ – 20	11.112	1.270	8.00	22	115	6.30	9
$\frac{1}{2}$ – 20	12.700		9.00	24	119	7.10	10
$\frac{9}{16}$ – 18	14.288	1.411	11.20	25	127	9.00	12
$\frac{5}{8}$ – 18	15.875		12.50	25	137	10.00	13
$\frac{3}{4}$ – 16	19.050	1.588	14.00	29	149	11.20	14
$\frac{7}{8}$ – 14	22.225	1.814	16.00	33	158	12.50	16
1 – 12	25.400	2.117	18.00	35	172	14.00	18

Table 7. Dimensional tolerances on shanks and squares of ground-thread taps

Dimensions in millimetres

1		2	3	4	5
Shank diameter d_1 or square size a		Limits of tolerance on shank diameter d_1	Driving square		
Over	Up to and including		Limits of tolerance on square size a	Limits of tolerance on length of square l_2	
		Ground-thread taps (h9)	Ground-thread taps (h11)		
	3	0 - 0.025	0 - 0.060		± 0.8
3	6	0 - 0.030	0 - 0.075		
6	10	0 - 0.036	0 - 0.090		
10	18	0 - 0.043	0 - 0.011		
18	30	0 - 0.052	0 - 0.130		± 1.6
30	50	0 - 0.062	0 - 0.160		
50	56	0 - 0.074	0 - 0.190		

NOTE. For an explanation of the ISO system of limits and fits, including the meanings of the abbreviations h9 and h11, see BS 4500.

Table 8. Dimensional tolerances on lengths of thread and overall lengths of all taps

Dimensions in millimetres.

1		2	3	4
Nominal diameter of tap		Limits of tolerance on length of thread l	Limits of tolerance on overall length L	
Over	Up to and including			
	3.6	0 - 2.5	0 - 1.00	
3.6	10.0	0 - 3.2	0 - 1.20	
10.0	23.6	0 - 4.5	0 - 1.40	
23.6	42.5	0 - 5.0	0 - 1.60	
42.5	75.0	0 - 6.0	0 - 1.85	
75.0	101.6	0 - 6.3	0 - 2.10	

NOTE. The limits of tolerances on the overall length L of a short machine or hand tap for a coarse series thread are those designated by the symbol h15 for the overall length of that tap (see BS 4500). For a given nominal diameter of thread, the limits shown in the table are applicable whether the thread is a coarse series thread or a fine series and whether the tap is a short machine or hand tap or a long shank machine tap.

Section five. Tolerance classes of taps

12. Designations of classes

12.1 Three tolerance classes (termed class 1, class 2 and class 3) are used for the designation of taps for the production of Unified nuts of classes 3B, 2B and 1B with zero minimum clearance.

12.2 The tolerances designated by these class designations are unchanged from the tolerances specified in BS 949 : 1969 as follows:

- class 1 corresponds to zones 1 and 2 combined;
- class 2 corresponds to zone 3;
- class 3 corresponds to zone 4.

13. The difference in the classes

13.1 Taps of the different classes vary in the limits of size of the tap major diameter and pitch diameter in accordance with formulae which are given in appendix B.

13.2 The relationship between the limits of tolerance of the different classes of tap and their relationship with the nut pitch diameter are illustrated in figure 10.

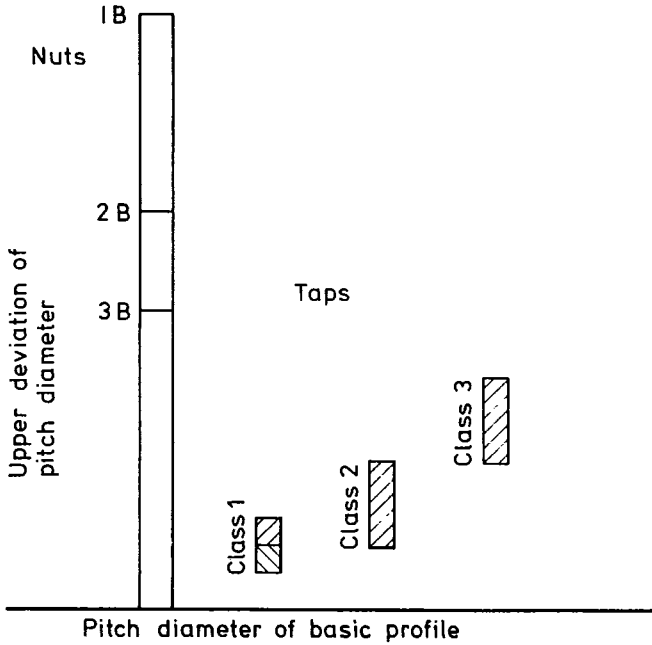


Figure 10. Relationship of tap classes to nut tolerances

14. Choice of tap tolerance class

14.1 Unless otherwise specified, taps of classes 1, 2 and 3 are used for the manufacture of Unified nuts of the following classes:

- class 1, for nuts of class 3B
- class 2, for nuts of class 2B
- class 3, for nuts of class 1B.

14.2 However, this correspondence is only of a general nature, since the accuracy of tapping varies with a number of factors such as the material being tapped, the condition of the machine tool, the tapping attachment, the tapping speed and the lubricant used.

14.3 Users are therefore recommended to select in each case, from previous experience or from special purpose tests, the most suitable class of tap for the manufacture of any required class of nut.