

Specification for

**Pipe threads for tubes
and fittings where
pressure-tight joints
are not made on the
threads (metric
dimensions)**

UDC 621.643.414:621.882.082.1

Committees responsible for this British Standard

This British Standard was entrusted by the Piping Systems Components Standards Committee (PSE/-) to Technical Committee PSE/9, upon which the following bodies were represented:

Association of Hydraulic Equipment Manufacturers
 British Compressed Air Society
 British Engine Group of the Society of Motor Manufacturers and Traders
 British Gas Corporation
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 British Malleable Tube Fittings Association
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 Water Authorities Association
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Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
<hr/>	
1 Scope	1
2 Symbols	1
3 Classification and designation	1
4 Thread details	4
<hr/>	
Appendix A Special truncated form of the Whitworth thread for class A external threads	5
Appendix B Notes on tolerancing system structure	5
Appendix C Method of verification of thread size and form by means of limit gauges	6
Appendix D Gauges for the method given in appendix C	8
<hr/>	
Figure 1 — Thread profile and tolerance zones	4
Figure 2 — Special truncated external thread	5
Figure 3 — NOT GO screw calliper gauge	7
Figure 4 — Start of complete thread	8
Figure 5 — Chamfer of start of thread	8
Figure 6 — Thread profiles of GO ring gauges and their check plugs	9
Figure 7 — Relative positions of pitch diameter tolerance zones for GO ring gauges and their check plugs	10
Figure 8 — Thread profiles of NOT GO ring gauges and their check plugs and calliper gauges	11
Figure 9 — Relative positions of pitch diameter tolerance zones for NOT GO ring gauges, calliper gauges and their check plugs	12
Figure 10 — Thread profiles of Go and NOT GO plug gauges	13
Figure 11 — Relative positions of pitch diameter tolerance zones for GO and NOT GO plug gauges	14
<hr/>	
Table 1 — Basic dimensions and tolerances	3
Table 2 — Special truncated fastening threads, class A external threads	5
Table 3 — Dimensions for GO and NOT GO gauges and their check plugs for class A external threads and for GO gauges and their check plugs for class B external threads	9
Table 4 — Other values for GO and NOT GO gauges and their check plugs for class A and class B external threads as a function of the pitch, P	10
Table 5 — Dimensions for NOT GO gauges and their check plugs for class B external threads	11
Table 6 — Dimensions for threaded GO and NOT GO plug gauges	13
Table 7 — Other values for GO and NOT GO plug gauges as a function of the pitch, P	14
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Publications referred to	Inside back cover

Foreword

This revision of BS 2779 has been prepared under the direction of the Piping Systems Components Standards Committee. It supersedes BS 2779:1973, which is withdrawn.

This standard is based on and is technically equivalent to the two Parts of ISO 228 "Pipe threads where pressure-tight joints are not made on the threads", namely ISO 228/1-1982 "Designation, dimensions and tolerances", and ISO/2-1980 "Verification by means of limit gauges"; both Parts are published by the International Organization for Standardization (ISO).

This standard provides a range of thread sizes which are considered to be necessary to fulfil general requirements. Dimensions are given in metric units only.

For ease of production, it has been found convenient to reproduce the figures from ISO 228/2-1980 for Figure 4, Figure 5, Figure 7, Figure 10 and Figure 11 of this standard.

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 and ii, pages 1 to 14, an inside back cover 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 specifies requirements for the designation and dimensions of Whitworth form fastening pipe threads having a thread size designation in the range 1/16 to 6 inclusive. This standard applies to pipe threads where pressure-tight joints are not made on the threads¹⁾. Dimensions are given in metric units. The tolerance on the crests of the threads allows for truncation (see 4.1).

NOTE 1 The pipe threads covered by this standard are generally used for fastening purposes, such as the mechanical assembly of the component parts of fittings, cocks and valves, etc.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Symbols

For the purposes of this British Standard, the following symbols apply.

Symbol	Term
b_3	Width of clearance groove at the major and minor diameter of the thread profile with shortened flanks.
d	Basic major diameter of the external thread.
d_1	Basic minor diameter of the external thread ($d_1 = d - 1.280\ 654P$).
d_2	Basic pitch diameter of the external thread ($d_2 = d - 0.640\ 327P$).
D	Basic major diameter of the internal thread ($D = d$).
D_1	Basic minor diameter of the internal thread ($D_1 = D - 1.280\ 654P = d_1$).
D_2	Basic pitch diameter of the internal thread ($D_2 = D - 0.640\ 327P = d_2$).
h	Height of the thread profile with rounded crests and roots.
H	Height of the triangle of the thread profile.
m	Distance between the middle of the tolerance zone T_R of the threaded ring gauge and the middle of the tolerance zone T_{CP} of the GO check plug.
P	Pitch.
r	Radius of rounded crests and roots.
s	Displacement of the clearance groove with shortened flanks.
S	Tolerance on b_3 .

T_{cp}	Tolerance on the pitch diameter of GO and NOT GO threaded check plugs and wear check plugs.
T_d	Tolerance on the basic major diameter of the external thread.
T_{d2}	Tolerance on the basic pitch diameter of the external thread.
T_{D1}	Tolerance on the basic minor diameter of the internal thread.
$T_{D,2}$	Tolerance on the basic pitch diameter of the internal thread.
T_{PL}	Tolerance on the pitch diameter of GO and NOT GO threaded plug gauges.
T_R	Tolerance on the pitch diameter of GO and NOT GO threaded ring gauges.
u	A length equal to twice the radial height of rounding at crest of root and thread ($u = 0.147\ 84P$).
W_{GO}	Average amount available for the permissible wear of GO threaded plug gauge and GO threaded ring gauge.
W_{NG}	Average amount available for the permissible wear of NOT GO threaded plug gauge and NOT GO threaded ring gauge.
Z_{PL}	Distance between the middle of the tolerance zone T_{PL} of the GO threaded plug gauge and the lower limit of the thread.
Z_R	Distance between the middle of the tolerance zone T_R of the GO threaded ring gauge and the upper limit of the thread.

3 Classification and designation

3.1 Classes of external and internal threads

For internal threads, one class of tolerance on the pitch diameter has been provided. For external threads, two classes of tolerance on the pitch diameter have been established, as follows:

- class A tolerance, entirely negative value equivalent to the internal thread tolerance (see Table 1);
- class B tolerance, entirely negative value twice that of the class A tolerance (see Table 1).

NOTE 1 Where no class reference is stated, class B should be assumed.

NOTE 2 The tolerance zones are shown in Figure 1.

NOTE 3 The choice of fit for a particular purpose rests with the purchaser's designer.

¹⁾ Reference should be made to BS 21 for requirements for pipe threads where pressure-tight joints are made on the threads.

3.2 Designation

Internal and external threads shall be designated by the letter "G" followed by the thread size designation given in Table 1, and, for external threads, the class reference: for example, G ½ for an internal thread, G ½ A for a class A external thread, and G ½ B for a class B external thread.

NOTE Where no class reference is stated, class B should be assumed.

Where threads are full form (see 4.1.2), the letter "F" shall be added to the designation, e.g. G ½ F for internal threads and G ½ AF for class A external threads.

Where external threads have the special truncated Whit-worth form in accordance with Table 2, the letter "T" shall be added to the designation, e.g. G ½ AT.

Table 1 — Basic dimensions and tolerances

1 Thread size designation	2 Number of threads in 25.4 mm	3 Pitch <i>P</i>	4 Depth of thread, <i>h</i>	5, 6, 7 Basic diameters			8, 9, 10, 11, 12 Tolerances on the basic pitch diameter ^b					13, 14 Tolerance on the basic minor diameter		15, 16 Tolerance on the basic major diameter	
							Internal thread, <i>T_{D2}</i>		External thread, <i>T_{d2}</i>			Internal thread, <i>T_{D1}</i>		External thread, <i>T_d</i>	
				Major <i>d = D</i>	Pitch <i>d₂ = D₂</i>	Minor <i>d₁ = D₁</i>	Lower deviation	Upper deviation	Lower deviation, class A	Lower deviation, class B	Upper deviation	Lower deviation	Upper deviation	Lower deviation	Upper deviation
				mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
<i>a</i> _{1/16}	28	0.907	0.581	7.723	7.142	6.561	0	+ 0.107	- 0.107	- 0.214	0	0	+ 0.282	- 0.214	0
<i>a</i> _{1/8}	28	0.907	0.581	9.728	9.147	8.566	0	+ 0.107	- 0.107	- 0.214	0	0	+ 0.282	- 0.214	0
<i>a</i> _{1/4}	19	1.337	0.856	13.157	12.301	11.445	0	+ 0.125	- 0.125	- 0.250	0	0	+ 0.445	- 0.250	0
<i>a</i> _{3/8}	19	1.337	0.856	16.662	15.806	14.950	0	+ 0.125	- 0.125	- 0.250	0	0	+ 0.445	- 0.250	0
<i>a</i> _{1/2}	14	1.814	1.162	20.955	19.793	18.631	0	+ 0.142	- 0.142	- 0.284	0	0	+ 0.541	- 0.284	0
<i>a</i> _{5/8}	14	1.814	1.162	22.911	21.749	20.587	0	+ 0.142	- 0.142	- 0.284	0	0	+ 0.541	- 0.284	0
<i>a</i> _{3/4}	14	1.814	1.162	26.441	25.279	24.117	0	+ 0.142	- 0.142	- 0.284	0	0	+ 0.541	- 0.284	0
<i>a</i> _{7/8}	14	1.814	1.162	30.201	29.039	27.877	0	+ 0.142	- 0.142	- 0.284	0	0	+ 0.541	- 0.284	0
<i>a</i> ₁	11	2.309	1.479	33.249	31.770	30.291	0	+ 0.180	- 0.180	- 0.360	0	0	+ 0.640	- 0.360	0
<i>a</i> _{1/8}	11	2.309	1.479	37.897	36.418	34.939	0	+ 0.180	- 0.180	- 0.360	0	0	+ 0.640	- 0.360	0
<i>a</i> _{1/4}	11	2.309	1.479	41.910	40.431	38.952	0	+ 0.180	- 0.180	- 0.360	0	0	+ 0.640	- 0.360	0
<i>a</i> _{1/2}	11	2.309	1.479	47.803	46.324	44.845	0	+ 0.180	- 0.180	- 0.360	0	0	+ 0.640	- 0.360	0
<i>a</i> _{3/4}	11	2.309	1.479	53.746	52.267	50.788	0	+ 0.180	- 0.180	- 0.360	0	0	+ 0.640	- 0.360	0
<i>a</i> ₂	11	2.309	1.479	59.614	58.135	56.656	0	+ 0.180	- 0.180	- 0.360	0	0	+ 0.640	- 0.360	0
<i>a</i> _{2/4}	11	2.309	1.479	65.710	64.231	62.752	0	+ 0.217	- 0.217	- 0.434	0	0	+ 0.640	- 0.434	0
<i>a</i> _{2/2}	11	2.309	1.479	75.184	73.705	72.226	0	+ 0.217	- 0.217	- 0.434	0	0	+ 0.640	- 0.434	0
<i>a</i> _{3/4}	11	2.309	1.479	81.534	80.055	78.576	0	+ 0.217	- 0.217	- 0.434	0	0	+ 0.640	- 0.434	0
<i>a</i> ₃	11	2.309	1.479	87.884	86.405	84.926	0	+ 0.217	- 0.217	- 0.434	0	0	+ 0.640	- 0.434	0
<i>a</i> _{3/2}	11	2.309	1.479	100.330	98.851	97.372	0	+ 0.217	- 0.217	- 0.434	0	0	+ 0.640	- 0.434	0
<i>a</i> ₄	11	2.309	1.479	113.030	111.551	110.072	0	+ 0.217	- 0.217	- 0.434	0	0	+ 0.640	- 0.434	0
<i>a</i> _{4/2}	11	2.309	1.479	125.730	124.251	122.772	0	+ 0.217	- 0.217	- 0.434	0	0	+ 0.640	- 0.434	0
<i>a</i> ₅	11	2.309	1.479	138.430	136.951	135.472	0	+ 0.217	- 0.217	- 0.434	0	0	+ 0.640	- 0.434	0
<i>a</i> _{5/2}	11	2.309	1.479	151.130	149.651	148.172	0	+ 0.217	- 0.217	- 0.434	0	0	+ 0.640	- 0.434	0
<i>a</i> ₆	11	2.309	1.479	163.830	162.351	160.872	0	+ 0.217	- 0.217	- 0.434	0	0	+ 0.640	- 0.434	0

^a Preferred sizes.

^b For thin walled parts, the tolerances on pitch diameters apply to the mean pitch diameter, which is the arithmetical mean of two diameters measured at right angles to each other.

4 Thread details

4.1 Form of thread

4.1.1 The basic form of the thread shall be the basic Whitworth form, as shown in Figure 1.

NOTE This form is identical with that specified for the parallel thread in BS 21.

4.1.2 For internal threads, the crests of the thread shall have one of the following forms:

- the full form, as shown in Figure 1; or
- the truncated form, with crests truncated to the tolerances given in Table 1.

NOTE The form of thread should be agreed between the manufacturer and the purchaser.

4.1.3 For external threads, the crests of the thread shall have one of the following forms:

- the full form, as shown in Figure 1; or
- the truncated form, with crests truncated to the tolerances given in Table 1; or
- for class A threads only, the special truncated form, in accordance with appendix A.

NOTE The special truncated form of thread is used where galling of the threads may occur.

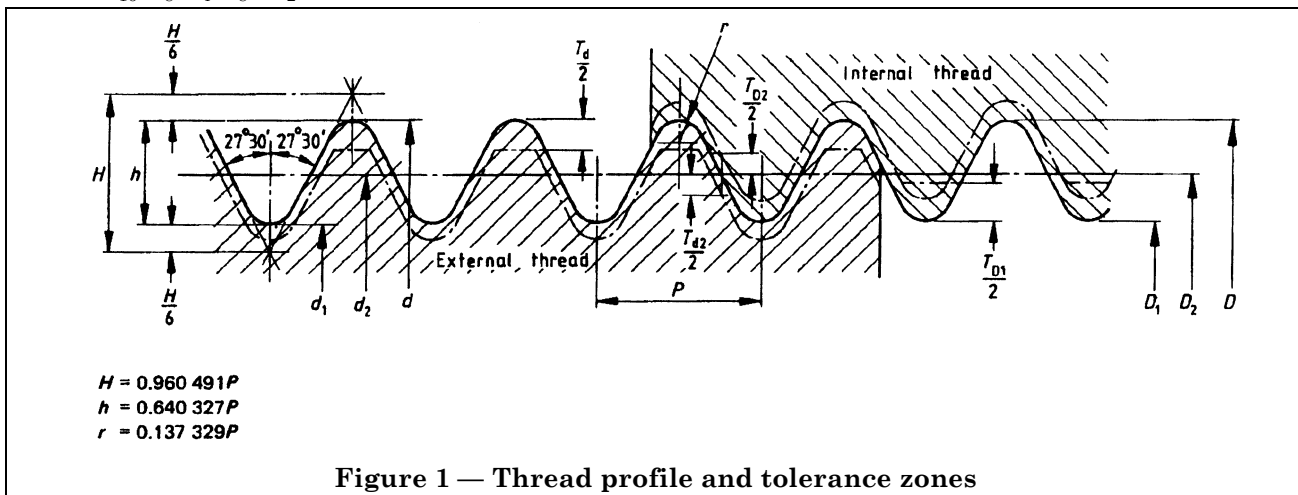
4.2 Dimensions and tolerances

4.2.1 *Dimensions.* The basic dimensions for the threads shall be as given in Table 1, except for class A external threads with the special truncated form [see 4.1.3 c)].

4.2.2 *Tolerances.* Tolerances for the major, pitch and minor diameters shall be as given in Table 1, except for class A external threads with the special truncated form [see 4.1.3 c)].

NOTE 1 Reference should be made to appendix B for further information on the tolerancing system structure. Tolerance zones are shown in Figure 1.

NOTE 2 The tolerances for the basic pitch diameter of internal threads given in Table 1 correspond to the positive deviation of the diameter specified in BS 21, with the exception of the tolerances for the following thread size designations, for which slightly higher tolerances have been specified: $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $2\frac{1}{2}$, 3, 4, 5, and 6.



4.3 Compliance

NOTE No method is specified for verification of compliance with the requirements of 4.1 and 4.2, but the method described in appendix C, using the gauges described in appendix D, is recommended.

If tested in accordance with appendices C and D, the threads shall be deemed to comply with the standard if they are in accordance with the following.

a) For external threads:

- with the solid threaded GO ring gauge, the gauge shall pass over the whole length of the thread;
- with the NOT GO screw calliper gauge, at any position, the gauge shall not pass over a threaded part, except for the first two threads of the part thread;
- with the solid threaded NOT GO ring gauge, using either side of the gauge, it shall not be possible to screw the gauge on to the thread by more than two turns of thread. In addition, the gauge shall not pass completely over a threaded part having a length of three threads or less.

b) For internal threads:

- with the threaded GO plug gauge, the gauge shall pass through the whole length of the thread;
- with the threaded NOT GO plug gauge, the gauge shall not enter either end of the thread by more than two turns of thread. In addition, the gauge shall not pass completely through a threaded part with a length of three threads or less.

Appendix A Special truncated form of the Whitworth thread for class A external threads

The dimensions of the special truncated Whitworth form shall be in accordance with Table 2. The thread form shall be as shown in Figure 2.

NOTE 1 These threads should only be supplied when specified on a component drawing.

NOTE 2 In the truncated Whitworth form of external thread, the basic rounded crest at the major diameter is removed at the junction with the straight flanks of the basic thread form. This reduction from the basic major diameter is equal to $0.14784P$ (see Figure 2). The resulting flat crest of the thread is given a suitable manufacturing tolerance.

Table 2 — Special truncated fastening threads, class A external threads

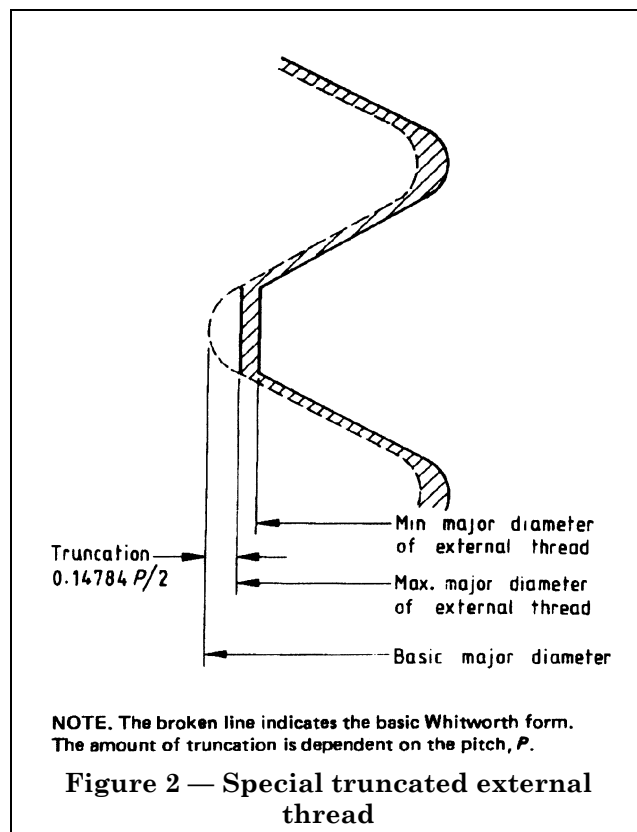
1 Thread size designation	2 Number of threads in 25.4 mm	3 External thread major diameter		
		maximum	tolerance	4 minimum
		mm	mm	mm
$1/16$	28	7.590	-0.122	7.468
$1/8$	28	9.594	-0.122	9.472
$1/4$	19	12.959	-0.144	12.815
$3/8$	19	16.464	-0.144	16.320
$1/2$	14	20.686	-0.170	20.516
$5/8$	14	22.642	-0.170	22.472
$3/4$	14	26.172	-0.170	26.002
$7/8$	14	29.931	-0.170	29.761
1	11	32.908	-0.198	32.710
$1\frac{1}{4}$	11	41.570	-0.198	41.372
$1\frac{1}{2}$	11	47.462	-0.198	47.264

Appendix B Notes on tolerancing system structure

In Table 1, the pitch diameter tolerances, which are intended to include the diametral effect of pitch and angle errors, have been calculated from the general formula: 0.0625 multiplied by the deviation on the internal thread length of BS 21. Thus:

- the positive deviation of internal threads = $+ 0.0625 \times$ length deviation;
- the negative deviation of class A external threads = $- 0.0625 \times$ length deviation;
- the negative deviation of class B external threads = $- 0.125 \times$ length deviation.

Lengths of engagement are not specified; these will depend upon the application. However, for long lengths of engagement (e.g. more than 15 pitches), it is essential that care be taken to ensure that there is not excessive deviation from the pitch, roundness or straightness of the threads, particularly when using class A external threads.



Tolerances are not specified for the minor diameters of external threads nor for the major diameters of internal threads. In practice, these diameters will be controlled by the profiles of the tools used to cut the threads. The minor diameter of external threads should not be greater than the basic minor diameter, while the major diameter of internal threads should not be smaller than the basic major diameter.

It should be noted that the internal thread minor diameter tolerances are such as to permit a tapping drill of ample size to be used. If full advantage is taken of these generous minor diameter tolerances, the crests of the internal threads will be flat. It should also be noted that the external thread major diameter tolerances are generally such as to permit crests which do not have a complete radius.

Errors in the pitch and flank angles of a thread virtually increase the pitch diameter of an external thread and decrease the pitch diameter of an internal thread. The minimum material limits stated in Table 1 and Table 2 apply to the simple pitch diameter (as measured along the pitch line of the thread); the maximum material limits apply to the pitch diameter as virtually increased (for external threads) or decreased (for internal threads) by the diametral equivalents of any errors present in the flank angles and in the pitch over the length of engagement.

For thin-walled parts, the tolerances on pitch diameters apply to the mean pitch diameter, which is the arithmetical mean of two diameters measured at right angles to each other.

Appendix C Method of verification of thread size and form by means of limit gauges

C.1 External threads

C.1.1 Principles

C.1.1.1 Solid threaded GO ring gauge. The gauge checks the virtual size of the internal thread on the GO side, i.e. it gauges the virtual pitch diameter. This is done by checking the maximum material limit of the pitch diameter. During this process the following factors, which produce an apparent enlargement of the pitch diameter (represented by the dimension, virtual pitch diameter), are taken into account.

- a) Deviations from the form.
- b) Departures from roundness.
- c) Lack of straightness of the thread axis over the gauge length.
- d) Pitch errors.
- e) Helix variations.
- f) Errors in the flank angles.

In addition, this gauge checks that the rounding at the root of the profile does not encroach too far upon the flank of the thread. It also verifies that the thread crest form does not transgress the maximum material profile.

C.1.1.2 NOT GO Screw Calliper Gauge. The gauge is used to check the minimum limit of the pitch diameter.

C.1.1.3 Solid threaded NOT GO ring gauge. The gauge is used to check whether the actual pitch diameter exceeds the specified minimum size.

C.1.2 Gauges. The gauges shall be in accordance with appendix D. Since the 55° profile has different elements to be verified, it is necessary to provide for several GO and NOT GO gauges.

C.1.3 Control of solid threaded ring gauges

C.1.3.1 New gauges. Check the GO and NOT GO ring gauges with the GO check plug (see **D.2.1.2** and **D.2.2.2.1**) of the appropriate size, by attempting to screw the check plug, by hand and without using excessive force, through the gauge. Check that the check plug will pass completely through the ring gauge.

Check that the maximum size of the pitch diameter of the ring gauge is not exceeded, either using the NOT GO check plug (see **D.2.1.2** and **D.2.2.2.1**) or by some other method. If the NOT GO check plug is used, attempt to screw the appropriate check plug, by hand and without using excessive force, into both ends of the gauge. Remove the check plug, counting the turns of thread, and ensure that the check plug has not engaged the ring gauge by more than one turn. Record the number of turns of thread.

C.1.3.2 Checking for wear. Check the GO and NOT GO ring gauges regularly with the appropriate wear check plug (see **D.2.1.2** and **D.2.2.2.1**). Attempt to screw the wear check plug, by hand and without using excessive force, into both ends of the gauge. Remove the check plug, counting the turns of thread, and ensure that the check plug has not engaged the ring gauge by more than one turn. Record the number of turns of thread.

C.1.4 Procedure for gauging threads

C.1.4.1 Solid threaded GO ring gauge. Without using excessive force, attempt to screw the gauge by hand over the whole length of the thread.

C.1.4.2 Solid threaded NOT GO ring gauge. Without using excessive force and using either side of the gauge, screw the gauge by hand on to the thread for as many turns as possible. Unscrew the gauge and record the number of turns engaged.

C.1.4.3 NOT GO screw calliper gauge

C.1.4.3.1 Setting the gauge. Use the setting plug appropriate to the gauge in use to set the anvils of the gauge. Attempt to pass the gauge over the plug, under its own weight or under a fixed load.

NOTE The gauge may be moved slightly to and fro in a circumferential direction during this process.

If the gauge will not pass over the plug or if there is a clearance, adjust the anvils of the gauge and repeat the procedure.

C.1.4.3.2 Main procedure. In at least three positions evenly distributed over the circumference, attempt to pass the gauge over the thread, under its own weight or under a fixed load.

NOTE The gauge may be moved slightly to and fro in a circumferential direction during this process.

If the gauge shown in Figure 3(b) is used, repeat each check after having displaced the gauge from one pitch to the other.

Record the positions of the thread the gauge passes over.

C.2 Internal threads

C.2.1 Principles

C.2.1.1 Threaded GO plug gauge. The gauge checks the virtual size of the internal thread on the GO side, i.e. it gauges the virtual pitch diameter. This is done by checking the minimum material limit of the pitch diameter. During this process the following factors, which produce an apparent reduction of the pitch diameter (represented by the dimension, virtual pitch diameter), are taken into account.

- Deviations from the form.
- Departures from roundness.
- Lack of straightness of the thread axis over the gauge length.

- Pitch errors.
- Helix variations.
- Errors in the flank angles.

In addition, this gauge checks both the minimum limit of the major diameter and also that the rounding at the root of the profile does not encroach too far upon the flank of the thread.

C.2.1.2 Threaded NOT GO plug gauge. The gauge is used to check whether the actual pitch diameter exceeds the specified maximum size.

C.2.2 Gauges. The gauges shall be in accordance with appendix D.

C.2.3 Control of plug gauges. Examine the GO and NOT GO plug gauges regularly for wear by measurement.

NOTE The worn threads of a NOT GO plug gauge may be removed, provided that at least three turns of thread remain.

C.2.4 Procedure for gauging threads

C.2.4.1 Threaded GO plug gauge. Without using excessive force, attempt to screw the gauge by hand through the whole length of the thread.

C.2.4.2 Threaded NOT GO plug gauge. Without using excessive force, screw the gauge by hand into the thread for as many turns as possible. Unscrew the gauge and record the number of turns engaged.

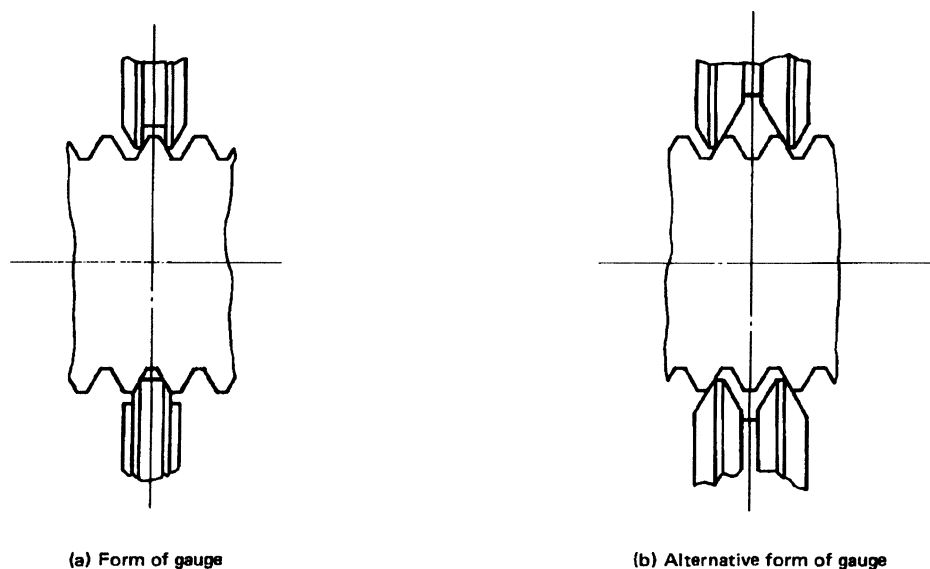


Figure 3 — NOT GO screw calliper gauge

Appendix D Gauges for the method given in appendix C

D.1 General

D.1.1 Taylor principle. All gauges and their setting plugs and check plugs should be designed to be in accordance with the Taylor principle as far as possible, except for the solid threaded NOT GO ring gauge.

NOTE 1 The Taylor principle is a statement to the effect that the maximum material limits of as many related elements or dimensions as practicable should be incorporated in the GO gauge, whereas the minimum material limit of each related element or dimension may be gauged only by individual minimum material limit gauges or gauging methods.

NOTE 2 Checking with a solid threaded NOT GO ring gauge does not correspond to the Taylor principle. For non-rigid machined pieces, the departure from the Taylor principle is of less importance because of the flexibility of the pieces.

D.1.2 Entry of the thread, incomplete threads, even if they are chamfered, are still sharp enough to break or deform. In order that checking will not be affected, it is recommended that the incompletely formed part of the thread be removed (see Figure 4) or, if this is not possible, that a chamfer to the thread root of $27^{\circ}30'$ be applied (see Figure 5).

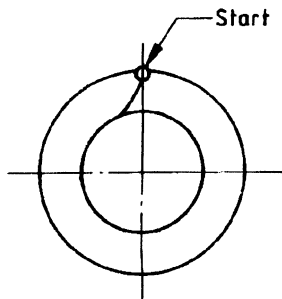


Figure 4 — Start of complete thread

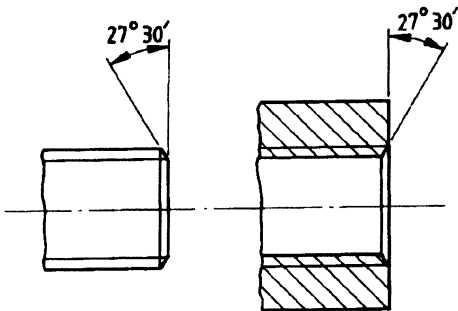


Figure 5 — Chamfer of start of thread

D.2 Ring gauges and calliper gauges for external threads

D.2.1 GO side

D.2.1.1 Gauges

D.2.1.1.1 Solid threaded GO ring gauges for class A and class B external threads shall be in accordance with Table 3 and Table 4. Ring gauge thread profiles shall be as shown in Figure 6.

NOTE 1 Tolerance zones are shown in Figure 7.

The values of d , d_1 and d_2 shall be as given in Table 1.

NOTE 2 The values specified in Table 3 and Table 4 for pitch, P , and tolerance on basic pitch diameter, $T d_2$, are identical with those given in Table 1.

D.2.1.1.2 The length of the thread on the gauge shall be at least 80 % of the thread length of the engaging part or component (i.e. the thread length of, for example, a nut).

D.2.1.2 Check plugs

NOTE The GO and NOT GO check plugs for the solid threaded GO ring gauge are used to check the limits of the pitch diameter of a new gauge. The wear check plug is used to ascertain that the pitch diameter of the solid threaded GO ring gauge has not exceeded the wear limit. It embodies the pitch diameter of the solid threaded GO ring gauge at the prescribed limit of wear.

GO, NOT GO and wear check plugs for ring gauges for class A and class B external threads shall be in accordance with D.2.1.1.1.

D.2.2 NOT GO side

D.2.2.1 Gauges

D.2.2.1.1 Solid threaded NOT GO ring gauges and NOT GO screw calliper gauges for class A external threads shall be in accordance with Table 3 and Table 4. Ring gauges and calliper gauges for class B external threads shall be in accordance with Table 4 and Table 5. Thread profiles shall be shown in Figure 8.

NOTE Tolerance zones are shown in Figure 9.

The values of d , d_1 and d_2 shall be as given in Table 1.

Table 3 — Dimensions for GO and NOT GO gauges and their check plugs for class A external threads and for GO gauges and their check plugs for class B external threads

Thread size designation	T_{d2} μm	T_R μm	T_{PL} μm	T_{CP} μm	m μm	Z_R μm	W_{NG} μm	W_{GO} μm
$1/16$ and $1/8^a$	107	15	10	9	17	2	13	18
$1/4$ and $3/8$	125	15	10	9	17	2	13	18
$1/2$ up to and including $7/8$	142	20	12	10	20	9	17	23
1 up to and including 2	180	20	12	10	20	9	17	23
$2\frac{1}{4}$ up to and including 4	217	25	15	13	24	13	21	28
$4\frac{1}{2}$ up to and including 6	217	25	15	13	24	13	21	28

^a For $1/16$ and $1/8$ GO ring gauges, for a pitch of 0.907 mm, a profile is permitted with a radius without an internal diameter, in millimetres, increased by the following.
 $(d_1 + 0.134 + T_R/2) \pm T_R/2 = d_1 + 0.142 \pm 0.0075$ [see Figure 6(a)].

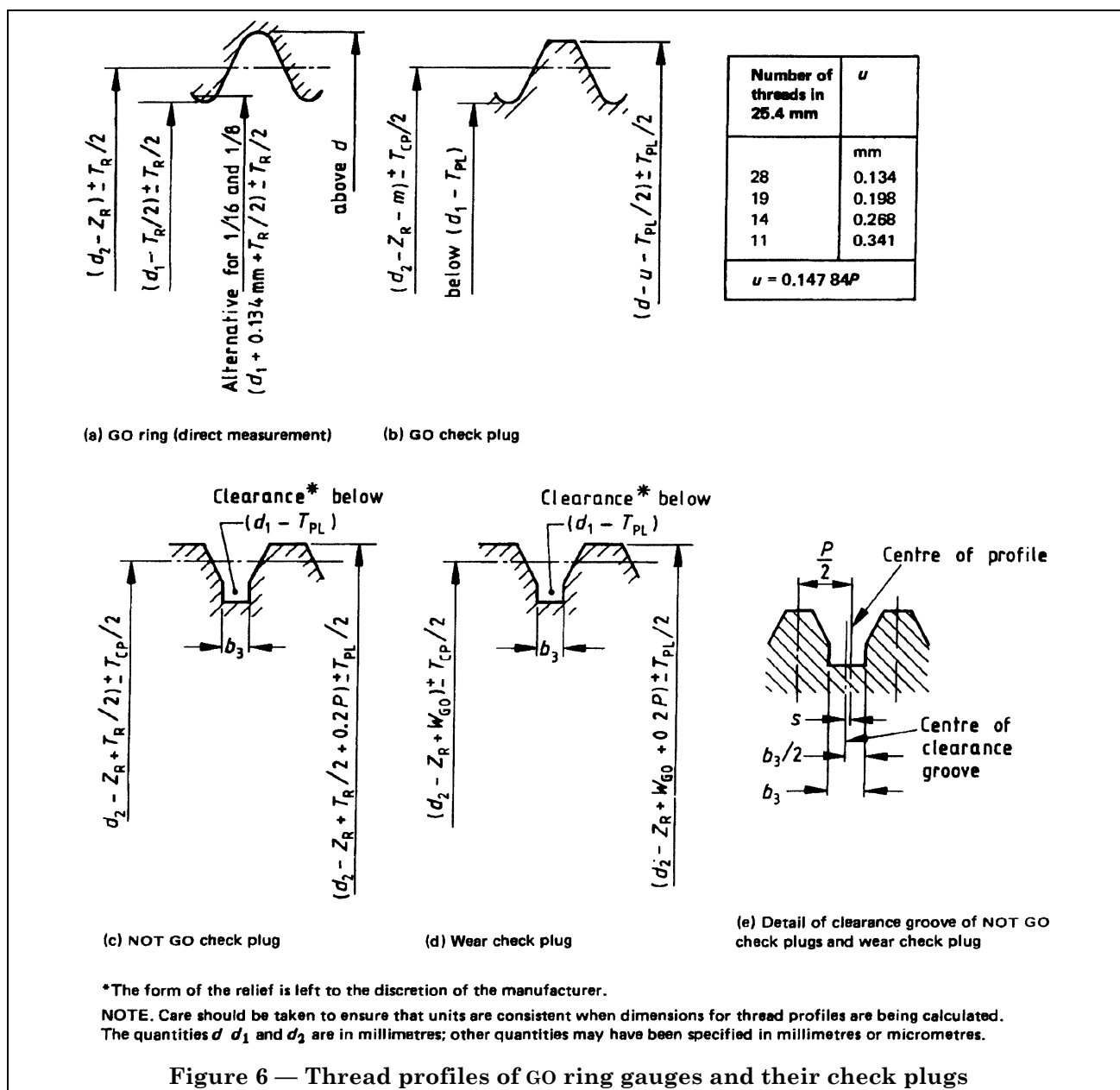


Table 4 — Other values for GO and NOT GO gauges and their check plugs for class A and class B external threads as a function of the pitch, P

Thread size designation	Pitch, P	Number of threads in 25.4 mm	Width of clearance groove at the major and minor diameter of the thread profile with shortened flanks, b_3		Tolerance on the half angle ($27^\circ 30'$) of check plugs and ring gauges
			Nominal	Tolerance S or as in note	
$1/16$ and $1/8$	mm 0.907 $\pm 0.005^a$	28	mm 0	mm —	minutes ± 15
$1/4$ and $3/8$	1.337 $\pm 0.005^a$	19	0.4	± 0.04	± 13
$1/2$ up to and including $7/8$	1.814 $\pm 0.005^a$	14	0.5	+ 0,05	± 11
1 up to and including 6	2.309 $\pm 0.005^a$	11	0.8	± 0.05	± 10

NOTE The maximum displacement permitted between the middle of the groove of width b_3 and that of the profile is equal to S . If the effective displacement, s , is less than S , it is permissible for the upper limit of b_3 (nominal $b_3 + S$) to be exceeded by twice the difference $S - s$; this is the equivalent of accepting for the distance between each lateral face of the groove and the middle of the profile the equal $[(\text{nominal } b_3 + S)/2] \pm S$

^a When measured between any two threads over the length of the gauge or check plug.

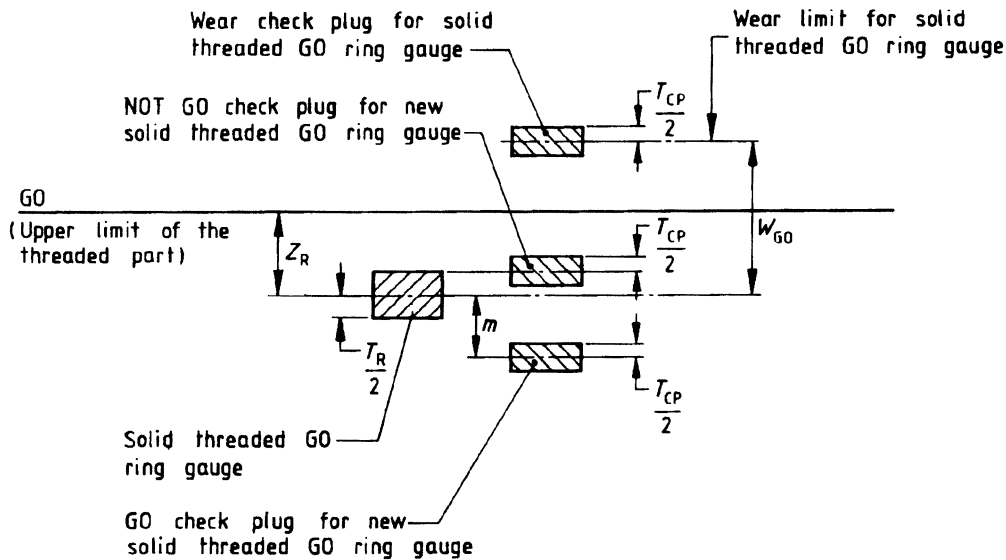


Figure 7 — Relative positions of pitch diameter tolerance zones for GO ring gauges and their check plugs

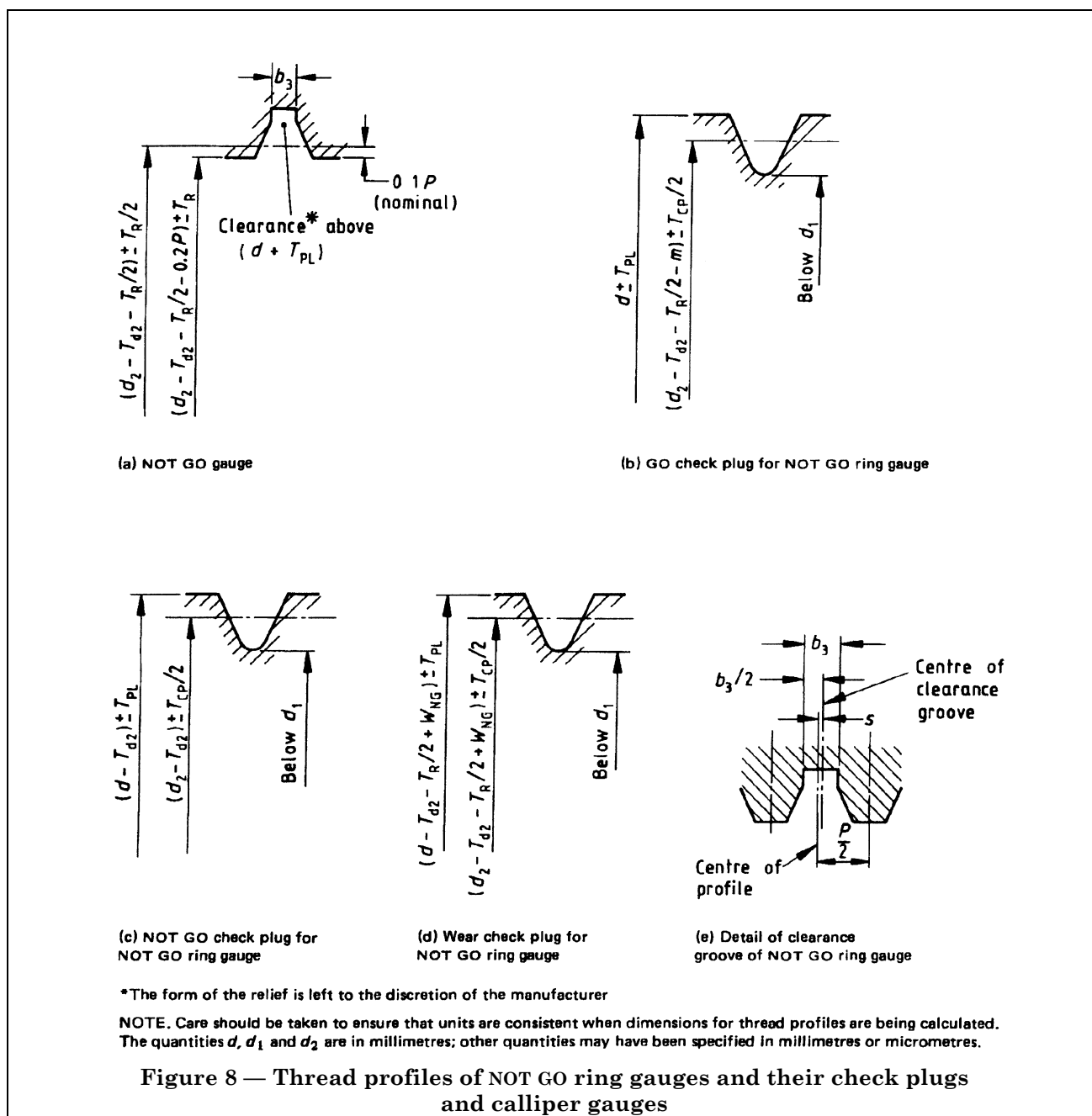


Table 5 — Dimensions for NOT GO gauges and their check plugs for class B external threads

Thread size designation	T_{d2} μm	T_R μm	T_{PL} μm	T_{CP} μm	m μm	W_{NG} μm
$1/16$ and $1/8$	214	25	15	13	24	21
$1/4$ and $3/8$	250	25	15	13	24	21
$1/2$ up to and including $7/8$	284	25	15	13	24	21
1 up to and including 2	360	33	20	17	30	28
$2 1/4$ up to and including 4	434	33	20	17	30	28
$4 1/2$ up to and including 6	434	33	20	17	30	28

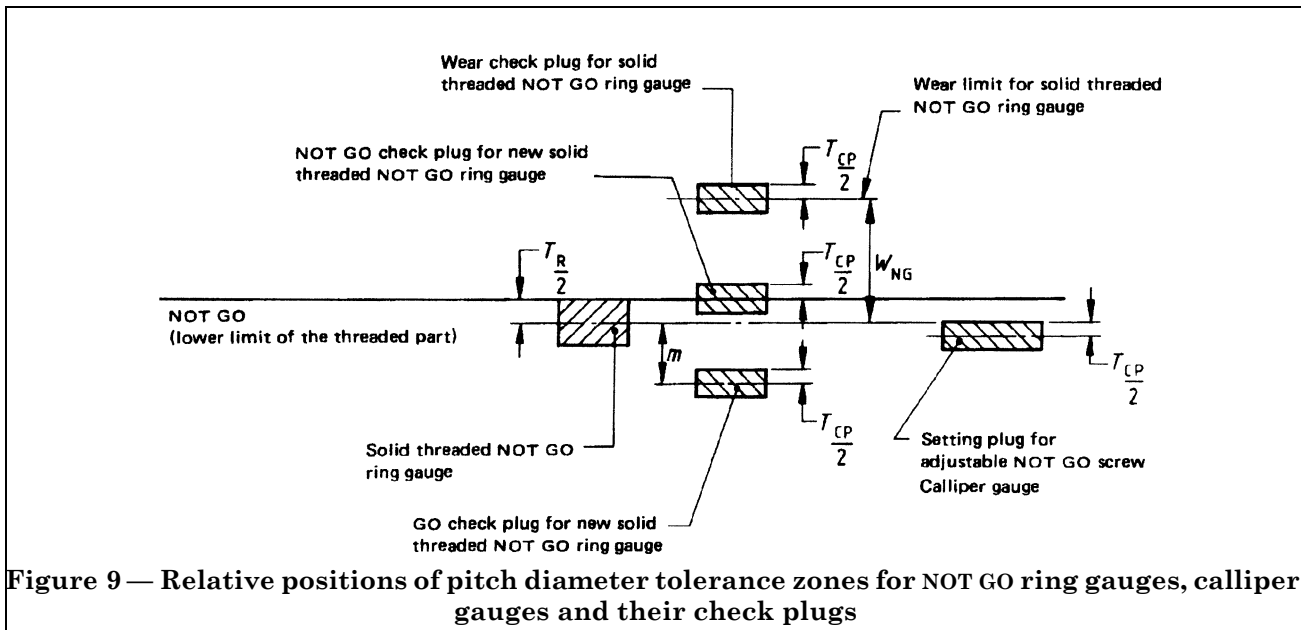


Figure 9 — Relative positions of pitch diameter tolerance zones for NOT GO ring gauges, calliper gauges and their check plugs

D.2.2.1.2 The solid threaded NOT GO ring gauge shall have a length of thread of at least three turns of thread. Each anvil of the NOT GO screw calliper gauge shall be so designed that it contacts the machined piece thread on no more than two flanks [see Figure 3(a) and (b)]. On fine pitch gauges, these flanks shall be situated not more than three pitches apart.

D.2.2.2 Check plugs and setting plugs

D.2.2.2.1 Check plugs for NOT GO ring gauge

NOTE The GO and NOT GO check plugs for the solid threaded NOT GO ring gauge are used to check the pitch diameter limits of a new gauge. The threaded GO check plug makes sure that the clearance diameter of the gauge is not too small. The wear check plug is used to check whether the pitch diameter of the gauge has exceeded the wear limit. It embodies the pitch diameter of the threaded NOT GO ring gauge at the prescribed limit of wear.

GO, NOT GO and wear check plugs for ring gauges for class A and class B external threads shall be in accordance with **D.2.2.1.1**.

D.2.2.2.2 Setting plugs for NOT GO screw calliper gauge.

Setting plugs shall be in accordance with **D.2.2.1.1**. Each setting plug shall have at least three complete threads.

D.3 GO and NOT GO plug gauges

The gauges shall be in accordance with Table 6 and Table 7. Thread profiles shall be as shown in Figure 10.

NOTE Tolerance zones are shown in Figure 11.

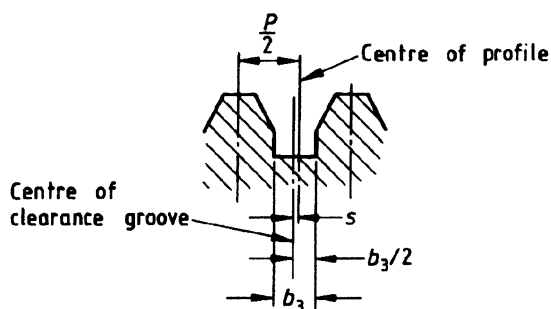
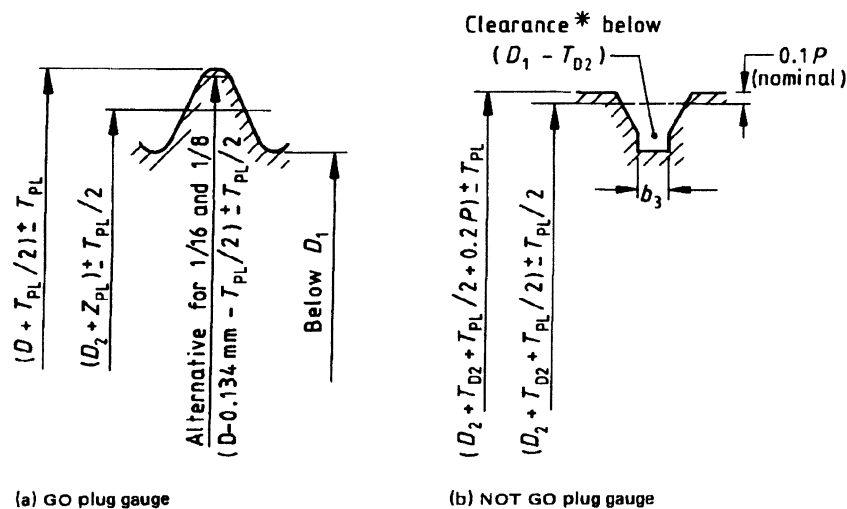
The values of D , D_1 and D_2 shall be as given in Table 1.

The length of thread on the GO plug gauge shall be at least 80 % of the thread length of the engaging part or component (i.e. the thread length of, for example, a nut). The NOT GO plug gauge shall have a length of thread of at least three complete threads.

Table 6 — Dimensions for threaded GO and NOT GO plug gauges

Thread size designation	T_{D2} μm	Z_{PL} μm	T_{PL} μm	W_{NG} μm	W_{GO} μm
$1/16$ and $1/8^a$	107	8	10	10	14
$1/4$ and $3/8$	125	8	10	10	14
$1/2$ up to and including $7/8$	142	13	12	13	19
1 up to and including 2	180	13	12	13	19
$2^{1/4}$ up to and including 4	217	18	15	17	23
$4^{1/2}$ up to and including 6	217	18	15	17	23

^a For $1/16$ and $1/8$ GO plug gauges, for a pitch of 0.907 mm, a profile is permitted without a radius with an external diameter, in millimetres, increased by the following:
 $(D - 0.134 - T_{PL}/2) \pm T_{PL}/2 = D - 0.139 \pm 0.005$ (see Figure 10)



(c) Details of clearance groove of NOT GO plug gauge

*The form of the relief is left to the discretion of the manufacturer.

NOTE. Care should be taken to ensure that units are consistent when dimensions for thread profiles are being calculated. The quantities D , D_1 and D_2 are in millimetres; other quantities may have been specified in millimetres or micrometres.

Figure 10 — Thread profiles of GO and NOT GO plug gauges

Table 7 — Other values for GO and NOT GO plug gauges as a function of the pitch, P

Thread size designation	Pitch, P	Number of threads in 25.4 mm	Width of clearance groove at the major and minor diameter of the thread profile with shortened flanks, b_3		Tolerance on the half angle (27° 30')
			Nominal	Tolerance S or as in note	
$1/16$ and $1/8$	mm 0.907 $\pm 0.005^a$	28	mm 0	mm —	minutes ± 15
$1/4$ and $3/8$	1.337 $\pm 0.005^a$	19	0.4	± 0.04	± 13
$1/2$ up to and including $7/8$	1.814 $\pm 0.005^a$	14	0.5	± 0.05	± 11
1 up to and including 6	2.309 $\pm 0.005^a$	11	0.8	± 0.05	± 10

NOTE The maximum displacement permitted between the middle of the groove of width b_3 and that of the profile is equal to S . If the effective displacement, s , is less than S , it is permissible for the upper limit of b_3 (nominal $b_3 + S$) to be exceeded by twice the difference $S - s$; this is the equivalent of accepting for the distance between each lateral face of the groove and the middle of the profile the value [(nominal $b_3 + S$)/2] $\pm S$.

^a When measured between any two threads over the length of the plug gauge.

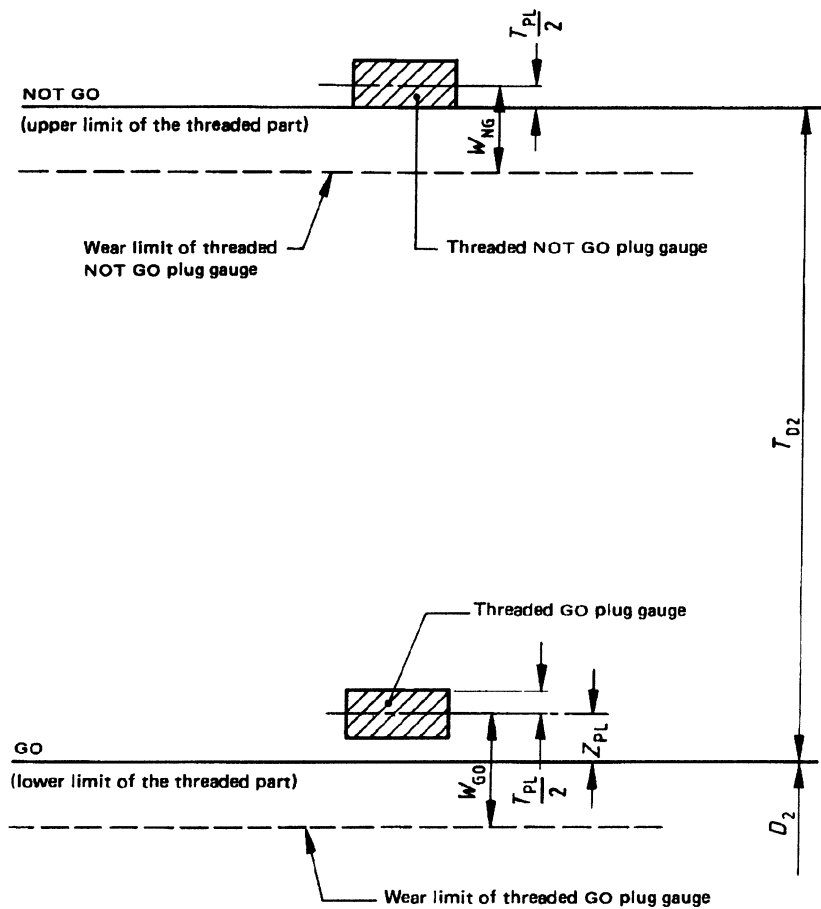


Figure 11 — Relative positions of pitch diameter tolerance zones for GO and Not Go plug gauges

Publications referred to

BS 21, *Specification for pipe threads for tubes and fittings where pressure-tight joints are made on the threads (metric dimensions).*

ISO 228, *Pipe threads where pressure-tight joints are not made on the threads²⁾.*

Part 1 Designation, dimensions and tolerances.

Part 2 Verification by means of limit gauges.

²⁾ Referred to in the foreword only.

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