BS 919-2:2007

Incorporating
Corrigendum No. 1

BRITISH STANDARD

Screw gauge limits and tolerances –

Part 2: Specification for gauges for screw threads of Whitworth and B.A. forms

ICS 21.040.20

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iii, a blank page, pages 1 to 34, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 30 November 2007. It was prepared by Subcommittee SFTSE/1, *Screws and fasteners technical specification committee*, under the authority of Technical Committee TDW/4, *Technical product realization*. A list of organizations represented on these committees can be obtained on request to their secretaries.

BS 919, *Screw gauge limits and tolerances* is in four parts:

Part 1: Specification for gauges for screw threads of unified form

Part 2: Specification for gauges for screw threads of Whitworth and B.A. forms

Part 3: Specification for gauges for screw threads of ISO metric form

Part 4: Limits of size for gauges for screw threads of unified form diameters $\frac{1}{4}$ in and larger

Supersession

This Part of BS 919 supersedes BS 919-2:1971, which is withdrawn.

Relationship with other publications

This British Standard is intended for use with BS 84, which specifies the corresponding screw threads.

Information about this document

This British Standard has been fully revised to bring it up to date.

The start and finish of text introduced or altered by Corrigendum No. 1 is indicated in the text by tags ▮C1⟩ ⟨C1▮.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in notes in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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1 Scope

This Part of BS 919 specifies requirements for the following gauges intended for checking screw threads in the regular series, such as BS Whit., BS Fine, B.A., BSC and BS Conduit.

a) Screw gauges for general and reference use:

1) solid (non-adjustable) screw plug gauges, GO and NOT GO;

2) solid and adjustable GO screw ring gauges;

3) adjustable thread calliper gauges, GO and NOT GO.

NOTE NOT GO effective diameter ring gauges are also included since they have certain limited applications. In principle, however, their use is not recommended.

b) Plain plug gauges and plain calliper gauges for the crests of threads.

NOTE Provision is made in the standard for both GO and NOT GO plain gauges, but GO plain gauges are normally required only in the case of threads where the corresponding GO screw gauges do not control the maximum metal condition at the crests of the threads of the product.

c) Setting plugs for adjustable screw ring and thread calliper gauges, GO and NOT GO.

This standard may be applied also to gauges for any screw threads of Whitworth form, but not to gauges for Acme, buttress or round threads.

Annex A provides guidance on the various types of gauges.

Information relating to the effective diameter equivalent of pitch and angle errors and to the thread form of NOT GO effective diameter gauges is given in Annex B, Annex C and Annex D.

No requirements are specified for the materials for gauges, but guidance on the hardness of gauges is given in Annex E.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 84, *Parallel screw threads of Whitworth form – Requirements*

BS 1044-1:1964, *Specification for gauge blanks – Part 1: Plug, ring and calliper gauges*

〚C1〛 BS 6528:1984, *Glossary of terms for cylindrical screw threads* 〚C1〛

3 Terms and definitions and symbols

3.1 Terms and definitions

For the purposes of this part of BS 919, the terms and definitions given in BS 6528:1984 and the following apply.

3.1.1 effective diameter

diameter of the pitch cylinder

*NOTE 1 This is the "simple" effective diameter, as distinct from the "virtual" effective diameter (see **3.1.2**).*

NOTE Also known as pitch diameter.

3.1.2 virtual effective diameter

effective diameter of an imaginary thread of perfect pitch and flank angle, having the full depth of flanks, but clear at the crests and roots, which would just assemble with the actual thread over the prescribed length of engagement

NOTE The "virtual" effective diameter exceeds the effective diameter in the case of an external thread, but is less than the effective diameter in the case of an internal thread by an amount corresponding to the combined diametral effects due to any errors in the pitch and/or the flank angles of the thread.

3.2 Symbols

For the purposes of this part of BS 919, the following symbols apply.

NOTE These are largely repeated from BS 6528 for the convenience of users of this standard.

C	truncation on external thread
D	major diameter of internal thread
D_1	minor diameter of internal thread
D_2	effective diameter of internal thread (see Note 2)
d	major diameter of external thread
d_1	minor diameter of external thread
d_2	effective diameter of external thread (see Note 2)
G_1, G_3 and T_1	tolerance on effective diameter
G_5 and T_3	tolerance on effective diameter equivalent of angle error
G_2, G_4 and T_2	tolerance on effective diameter equivalent of pitch and angle errors
G_6, G_7 and G_8	combined tolerance on effective diameter and effective diameter equivalent of pitch and angle errors
H	height of fundamental triangle
M	margin for wear
P	pitch
R	depth of truncation

4 Design

4.1 General

The general dimensions of blanks suitable for both screw and plain gauges shall conform to BS 1044-1.

4.2 Feather edges

To avoid feather edges on screw plug and ring gauges and setting plugs, the partial thread at both ends of the gauge shall be removed to a blunt start, except for:

a) screw plug gauges and setting plugs in sizes below 0.150 inch and/or with external cone centres; and

b) screw ring gauges $\frac{1}{2}$ inch nominal size and smaller or with pitches of 20 threads per inch and finer and on all screw plug gauges and setting plugs with pitches of 28 threads per inch and finer, for which a 60° chamfer from the axis of the gauge is permitted in lieu of the removal of the partial thread.

Not more than one complete turn of the thread shall be removed to the point where the full thread form is obtained.

On double length setting plugs with pitches of 28 threads per inch and coarser, where the truncated portion meets the full form portion, the feather edge shall be completely removed.

4.3 Dirt clearance grooves

When specified by the purchaser, screw plug gauges shall have a dirt clearance groove cut axial to the thread to a depth slightly below the root of the thread. This groove shall be cut at the position where the thread commences at its full section as described in **4.2**.

4.4 Removal of sharp edges

All sharp edges on the gauging portions and handles shall be removed.

5 Disposition of gauge tolerance zones

5.1 General GO screw gauges

The tolerance zones for the effective diameter of General GO gauges shall be situated inside the corresponding zones of workpiece tolerance, as shown in Figure 1. (See Annex B for notes on the conventional method of showing tolerance zones.)

NOTE A small margin within the workpiece tolerance zone is provided for wear on GO screw plug gauges (the maximum metal limit), beyond which GO gauges ought not to be permitted to wear.

GO gauges intended for checking Whitworth (close fit) and BSC (close class) classes of workpiece (see **A.1**) shall conform to **5.2**.

5.2 Reference GO [C1⟩ screw ⟨C1] gauges

The Reference GO plug gauge limits and the Reference setting plug limits for effective diameter shall be disposed bilaterally about the maximum metal limits of the workpiece (low limit for internal threads and high limit for external threads), as shown in Figure 1.

Reference GO screw ring gauges (solid or adjustable) and GO thread calliper gauges shall be adjusted to size by fitting them to Reference setting plugs.

NOTE 1 Such practice renders unnecessary any direct measurement of the diameter of the internal gauge.

NOTE 2 Workpieces ought only to be rejected on final inspection where a screw gauge has failed the Reference plug gauge in the case of internal threads, or a ring gauge set to a Reference setting plug in the case of external threads.

5.3 NOT GO screw gauges

The tolerance zones (effective diameter) for NOT GO effective diameter gauges shall be placed just outside the corresponding zones of workpiece tolerance, as shown in Figure 1.

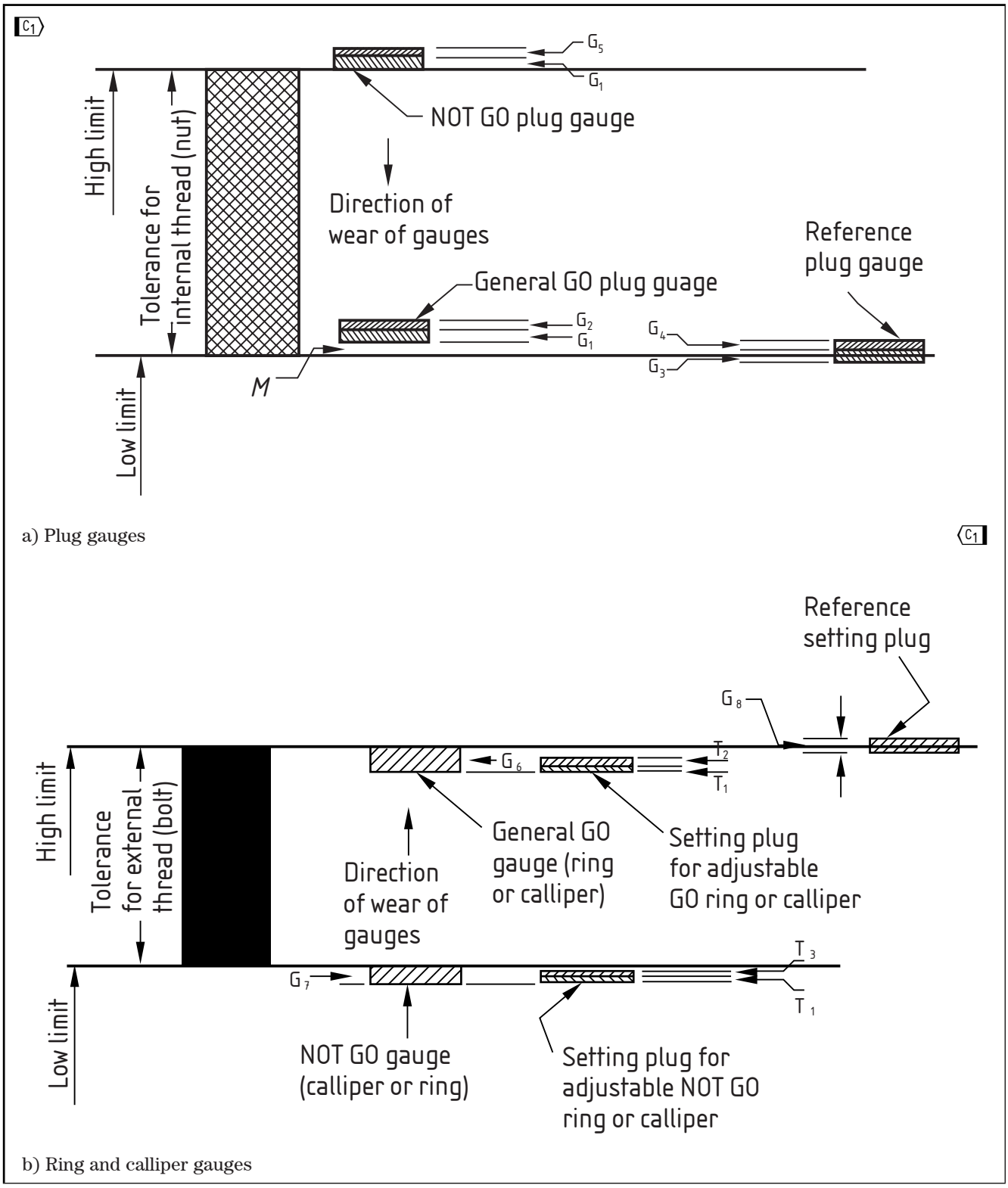
NOTE Wear causes NOT GO gauges to become gradually less accurate in the inspection of the workpieces.

5.4 Setting plugs

The tolerance zones for the effective diameters of both General and Reference setting plugs shall be as shown in Figure 1.

NOTE Too much emphasis cannot be laid on the importance of gauge users exercising vigilance in the effect of wear upon the sizes of gauges. Adjustable screw ring and calliper gauges should be maintained within their limits by resetting to their setting plugs at suitable intervals.

Figure 1 **Disposition of effective diameter tolerance zones for screw gauges**



6 Gauges for internal screw threads

6.1 GO screw plug gauges

6.1.1 Limits of tolerance

The limits of tolerance for General GO screw plug gauges shall be as specified in Table 1.

The limits of tolerance for Reference GO screw plug gauges (and GO screw plug gauges for Close fits) shall be as specified in Table 2.

NOTE Table 1 and Table 2 show the effective diameter tolerance in two independent parts, one for the effective diameter and the other for the effective diameter equivalent of the errors present in the pitch and angle of gauges. This method of specifying the tolerance is adopted to ensure a reasonable life for the gauges. Tables showing the effective diameter equivalent of errors in pitch and angle are given in Annex C.

6.1.2 Form and length of thread

GO screw plug gauges shall have the appropriate form of thread as shown in Figure 2.

The length of thread for normal purposes shall be determined by the length given in BS 1044-1, unless the length of engagement of the components is exceptionally long, in which case the length of the gauge can be increased.

6.2 NOT GO effective diameter screw plug gauges

6.2.1 Limits of tolerance

The limits of tolerance for NOT GO effective diameter screw plug gauges for all classes of workpieces shall be as shown in Table 3.

NOTE 1 As in the case of GO screw plug gauges, the effective diameter tolerance is shown in two parts.

NOTE 2 Ideally, the NOT GO screw plug gauge should not enter the workpiece. It may, however, be permitted to enter at the discretion of the inspector, provided that, on withdrawal, disengagement takes place within two turns of thread.

6.2.2 Form and length of thread

The threads of NOT GO effective diameter screw plug gauges shall be cleared at the crests and roots, as set out in Annex D. The gauges shall be threaded over the full length of the appropriate blank, as specified in BS 1044-1.

6.3 GO and NOT GO plain plug gauges

The limits of tolerance for GO and NOT GO plain plug gauges for the minor diameter of internal threads D_1 for all classes of workpiece shall be as specified in Table 4.

NOTE GO plain plug gauges are not normally required for Whitworth and B.A. threads.

7 Gauges for external screw threads and their setting plugs

7.1 GO screw ring and thread calliper gauges

7.1.1 Limits of tolerance

The limits of tolerance for General GO screw ring gauges and GO thread calliper gauges shall be as specified in Table 5.

*NOTE Because **5.2** specifies that Reference GO screw ring gauges (solid or adjustable) and GO thread calliper gauges are adjusted to size by fitting to Reference setting plugs, a specific table of tolerances for Reference GO screw ring and thread calliper gauges has not been provided.*

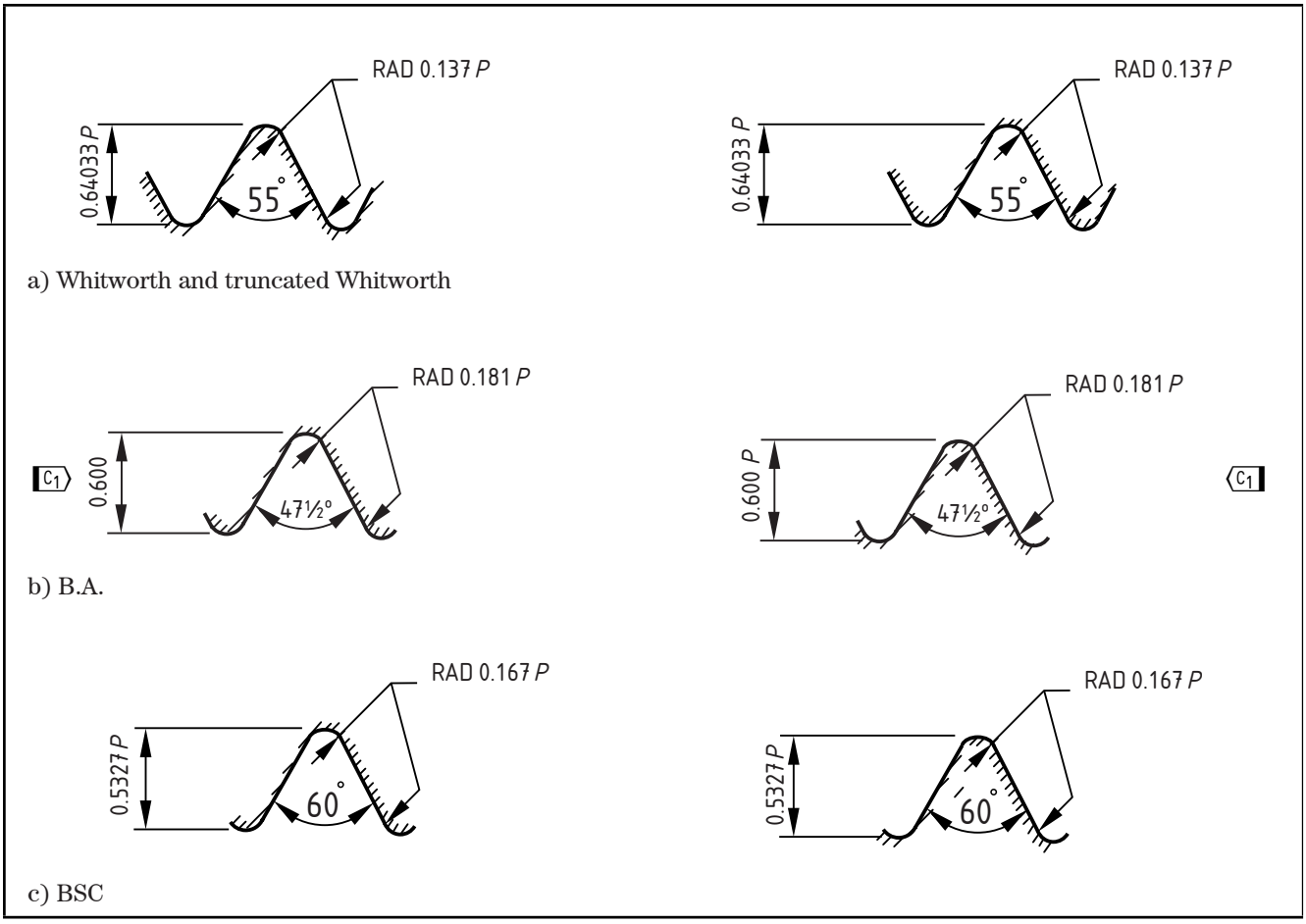
The limits of tolerance shown in Table 2 for the effective diameter equivalent of pitch and angle errors for Reference GO screw plug gauges shall be applied to Reference GO screw ring and thread calliper gauges.

7.1.2 Form and length of thread

GO screw ring and thread calliper gauges shall have the appropriate form of thread specified in Figure 2.

The length of thread of GO screw ring gauges for normal purposes shall be determined by the length specified in BS 1044-1, unless the length of engagement of the component is exceptionally long, in which case the length of the gauge can be increased.

Figure 2 **Forms of thread of GO screw gauges**



7.1.3 Effective diameter

Both the effective diameter and the virtual effective diameter, i.e. the effective diameter as reduced by the effective diameter equivalent of pitch and angle errors, shall lie within the tolerance zone G_6, as shown in Figure 7 (see also **C.5**).

7.2 NOT GO effective diameter screw ring and thread calliper gauges

7.2.1 Limits of tolerance

The limits of tolerance for NOT GO effective diameter screw ring and thread calliper gauges for all classes of workpiece shall be as specified in Table 6.

NOTE Ideally, the workpiece should not enter the NOT GO screw ring gauge. It may on occasion, however, at the discretion of the inspector, be permitted to enter, provided that on withdrawal disengagement takes place within two turns of thread.

7.2.2 Form and length of thread

As in the case of the corresponding plug gauges, the threads of NOT GO effective diameter screw ring and calliper gauges shall be cleared at the crests and roots (see Annex D) and the length of thread shall be limited to two or three pitches.

NOT GO effective diameter gauges shall be truncated at the crests in order to avoid fouling the maximum metal roundings on the product threads.

NOTE For solid NOT GO effective diameter plug and ring gauges it is convenient to refer the crest diameter to the basic effective diameter and to specify a constant difference. Such gauges have the same crest diameter irrespective of the grade or class of the product.

In the case of adjustable calliper gauge anvils, it is more convenient to dimension the truncation in relation to the pitch line of the anvil instead of the basic pitch line.

7.3 GO and NOT GO plain calliper gauges

The limits of tolerance for General GO and NOT GO plain calliper gauges for the major diameter of external threads for all classes of workpiece shall be as specified in Table 7.

NOTE GO plain calliper gauges are not normally required for Whitworth and B.A. threads.

7.4 Setting plugs

7.4.1 Limits of tolerance

Limits of tolerances for setting plugs for General adjustable screw ring and thread calliper gauges shall be as specified in Table 8.

The limits of tolerances for setting plugs for Reference adjustable screw ring and thread calliper gauges shall be as specified in Table 9.

7.4.2 Form of thread

Setting plugs for adjustable screw ring gauges and for GO and NOT GO threaded anvils of calliper gauges shall have the nominal form of thread appropriate to the gauge concerned, cleared at the crests and roots. The amount by which the major diameter of the setting plug differs from the nominal major diameter of the GO gauge shall be as follows.

Form of thread	**Reduction in major diameter for both plugs**
Whitworth	0.2 × pitch
BSC	0.2 × pitch
B.A.	0.27 × pitch

Tolerance on truncated major diameter = $^{0}_{-0.001}$ in.

The root form shall be that shown as Type II in Figure D.1 and Figure D.2.

8 Marking

Gauges shall be marked with the following particulars:

1) the size of the gauge, i.e. the actual limiting dimension of the workpiece which it is intended to control;

2) the designation of the thread specified in BS 84;

NOTE In the case of left-hand screw gauges, the symbol L.H. follows the designation.

3) in the case of GO screw gauges and setting plugs, "General" or briefly "Gen.", or "Reference" or briefly "Ref.", as appropriate;

4) "GO" or "NOT GO", as applicable;

5) the manufacturer's name or trade mark;

6) a serial number for recording purposes.

Examples of marking for gauges

Class of gauge	Marking
GO screw plug gauges	[C1⟩ ½ in BSF Ref., GO, EFF. 0.4600, X Co. No. 32. ⟨C1]
NOT GO screw plug gauges	[C1⟩ ½ in BSF Close, NOT GO, EFF. 0.4633, X Co. No. 51. ⟨C1]
Plain plug gauges for minor diameter	[C1⟩ ½ in BSF GO, 0.4200, X Co. No. 7. ⟨C1]
	[C1⟩ ½ in BSF NOT GO, 0.4395, X Co. No. 17. ⟨C1]
GO screw ring or thread calliper gauge	[C1⟩ ½ in BSF Ref., GO, EFF. 0.4600, X Co. No. 24. ⟨C1]
NOT GO thread calliper gauge	[C1⟩ ½ in BSF Med., NOT GO, EFF. 0.4550, X Co. No. 33. ⟨C1]
Plain calliper gauges for major diameter	[C1⟩ ½ in BSF GO, 0.4985, X Co. ⟨C1]
	[C1⟩ ½ in BSF NOT GO, 0.4910, X Co. ⟨C1]

The marking for plug gauges of the renewable-end type shall, where practicable, be on the end of the gauge member itself.

Where the size of the gauge is such that this cannot be done, the marking shall be on the taper shank.

Handles for the renewable-end type of gauge or setting plug shall be marked with same markings as the gauging members.

Figure 3 **General GO screw plug gauges**

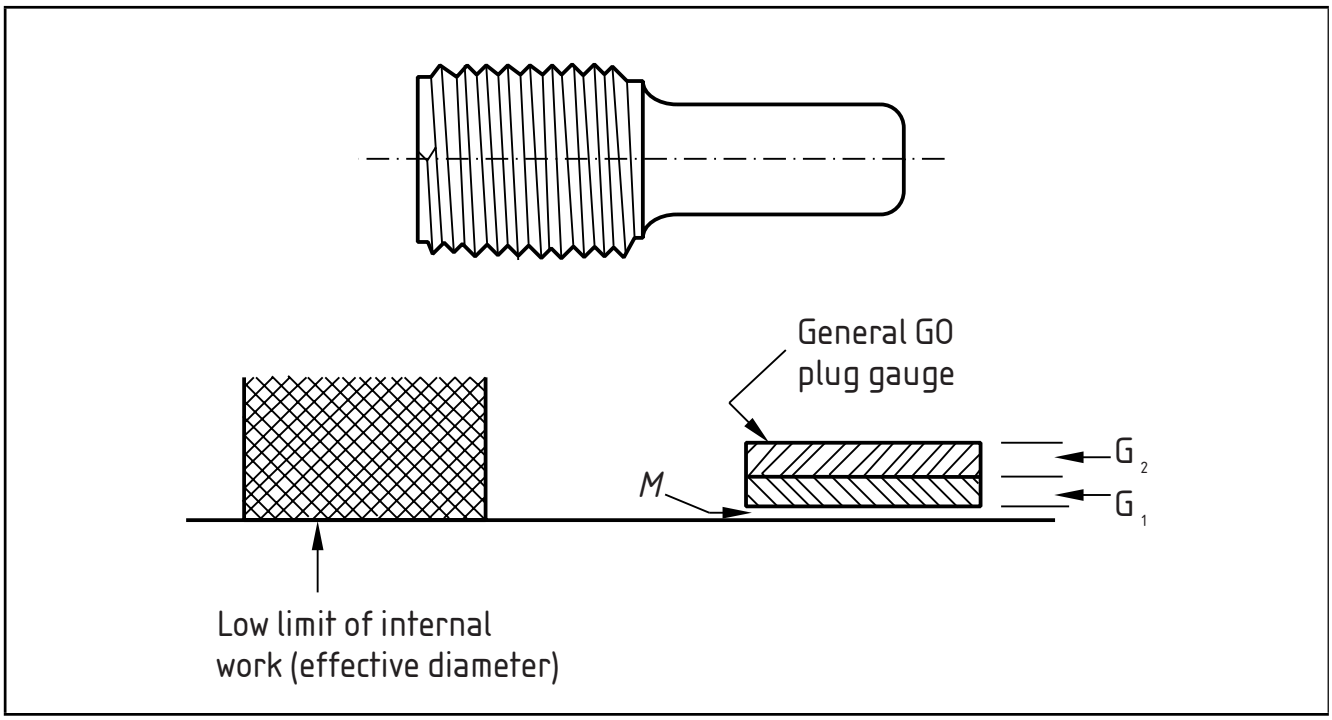


Table 1 **Limits of tolerance for General GO screw plug gauges**

Unit = in × 0.000 1

Nominal size of gauge		**Major diameter**	**Effective diameter** (G_1, Figure 3)	**Effective diameter equivalent of pitch and angle errors** (G_2, Figure 3) (see Annex C)						**Minor diameter**
Above	**Up to and including**			**Any pitch**	**56–22 t.p.i.**	**20–13 t.p.i.**	**12–8 t.p.i.**	**7 and 6 t.p.i.**	**5–4 t.p.i.**	
in	in									
	0.1	+5 +2	+5 +2	2						+5 −2
0.1	0.5	+6 +2	+6 +2		3	4	5			+6 −4
0.5	1.5	+7 +2	+7 +2		3	4	5	5		+7 −5
1.5	3.0	+9 +3	+9 +3		4	5	6	6	7	+9 −6
3.0	5.0	+10 +3	+10 +3			5	6	7	8	+10 −7
5.0	8.0	+12 +4	+12 +4			5	6	7	8	+12 −8
8.0	12.0	+14 +5	+14 +5				6	7	8	+14 −8

Figure 4 **Reference GO screw plug gauges**

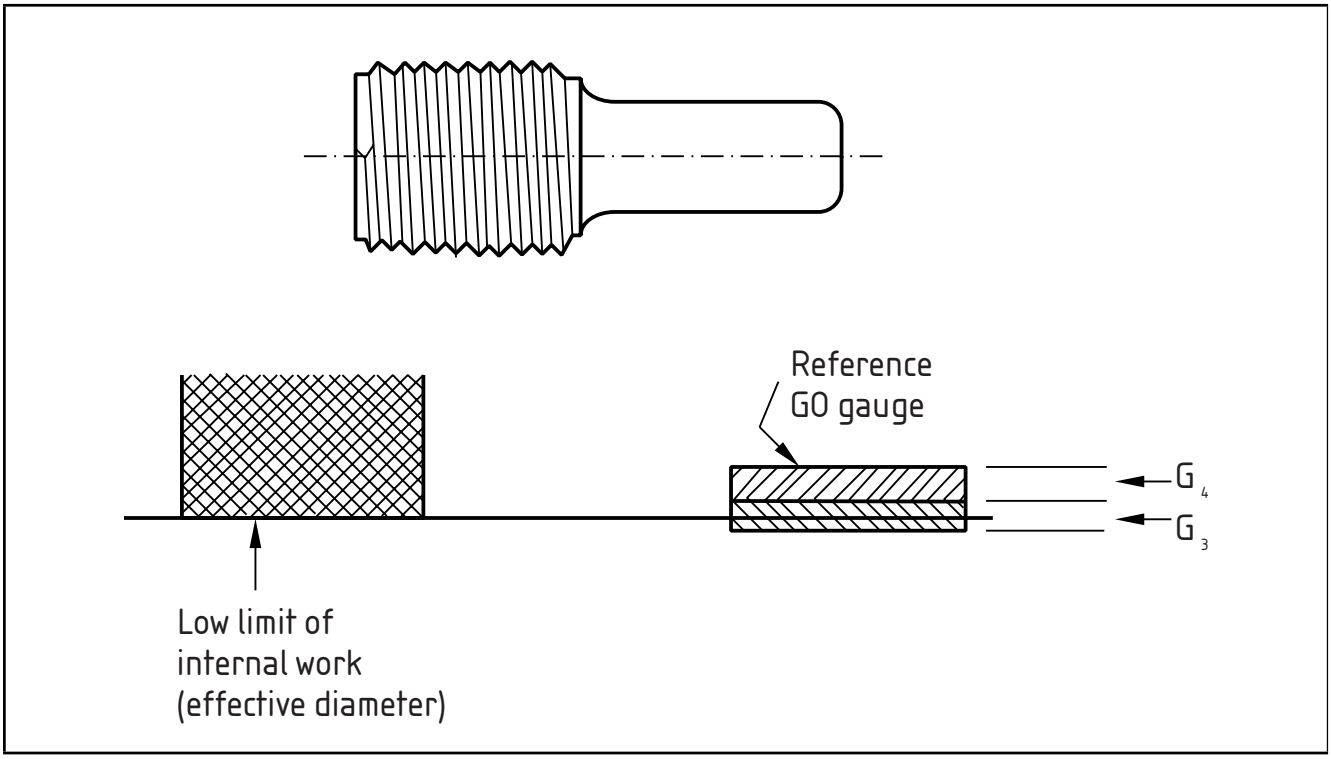


Table 2 **Limits of tolerance for Reference GO screw plug gauges (for use also for Close fit workpieces)**

Unit = in × 0.000 1

Nominal size of gauge		**Major diameter**	**Effective diameter** (G_3, Figure 4)	**Effective diameter equivalent of pitch and angle errors** (G_4, Figure 4) (see Annex C)						**Minor diameter**
Above	**Up to and including**			**Any pitch**	**56–22 t.p.i.**	**20–13 t.p.i.**	**12–8 t.p.i.**	**7 and 6 t.p.i.**	**5–4 t.p.i.**	
in	in									
	0.1	+1 −2	+1 −2	2						+1 −4
0.1	0.5	+1 −2	+1 −2		2	3	4			+1 −6
0.5	1.5	+1 −2	+1 −2		2	3	4	4		+1 −8
1.5	3.0	+2 −2	+2 −2		3	4	4	4	5	+2 −9
3.0	5.0	+2 −3	+2 −3			4	4	5	6	+2 −11
5.0	8.0	+3 −3	+3 −3			4	4	5	6	+3 −12
8.0	12.0	+3 −4	+3 −4				4	5	6	+3 −13

Figure 5 **NOT GO effective diameter plug gauges**

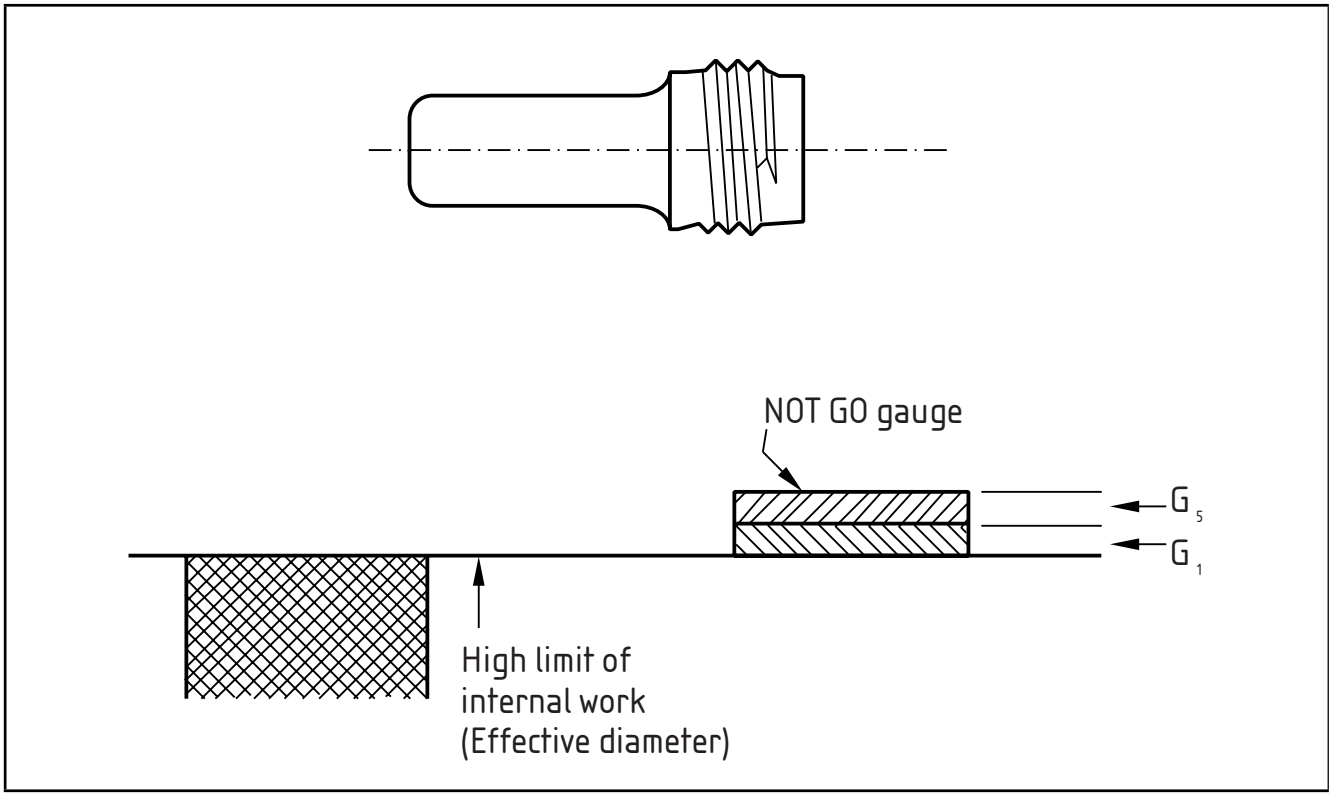


Table 3 **Limits of tolerance for NOT GO effective diameter plug gauges (All classes of workpiece)**

Unit = in × 0.000 1

Nominal size of gauge		**Effective diameter** (G_1, Figure 5)	**Effective diameter equivalent of angle error** (G_5, Figure 5) (see Annex C)					
Above	**Up to and including**		**Any pitch**	**56–22 t.p.i.**	**20–13 t.p.i.**	**12–8 t.p.i.**	**7 and 6 t.p.i.**	**5–4 t.p.i.**
in	in							
	0.1	+3 0	2					
0.1	0.5	+4 0		2	2	3		
0.5	1.5	+5 0		2	3	3	3	
1.5	3.0	+6 0		2	3	3	3	4
3.0	5.0	+7 0			3	3	4	4
5.0	8.0	+8 0			3	3	4	4
8.0	12.0	+9 0				3	4	4

Figure 6 **GO and NOT GO plain plug gauges for minor diameters**

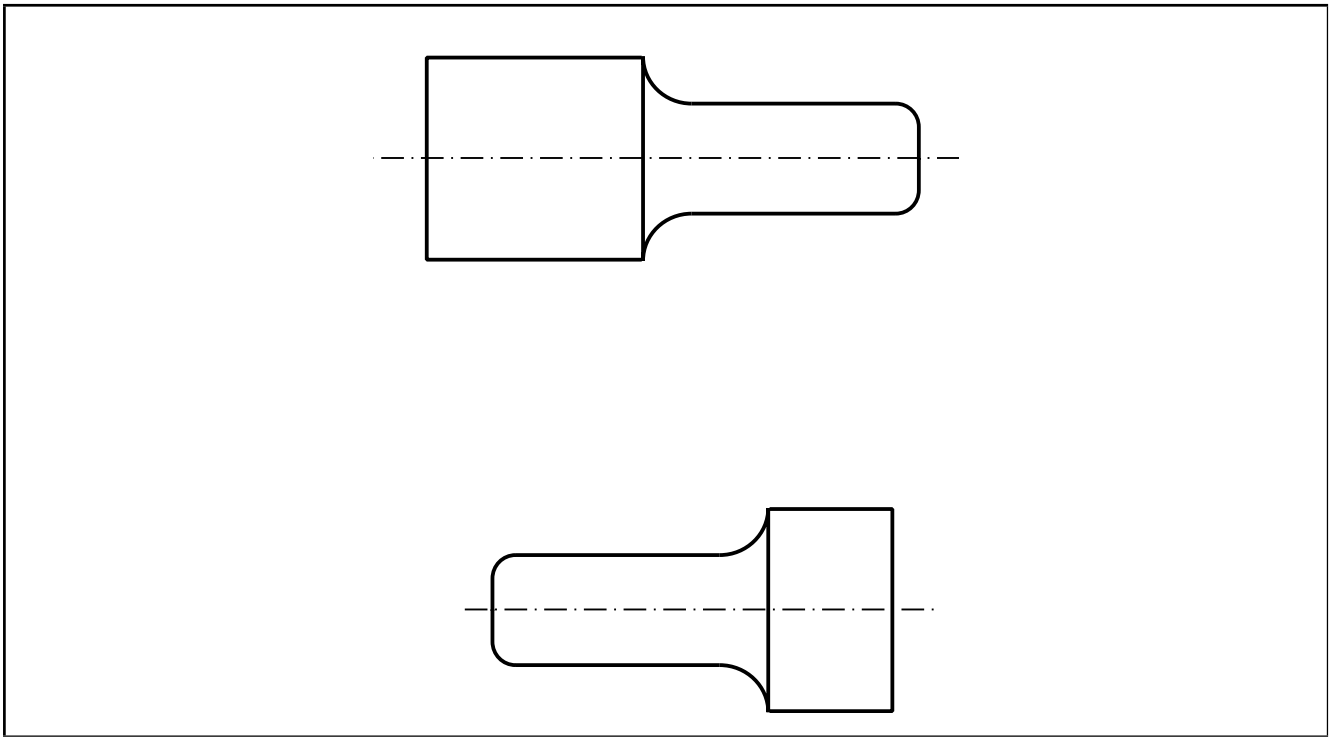


Table 4 **Limits of tolerance for GO and NOT GO plain plug gauges for minor diameters (All classes of workpiece)**

Unit = in × 0.000 1

Nominal size of plug gauge		**Limits of tolerance on plain diameter**
Above	**Up to and including**	
in	in	
	0.1	+2 0
0.1	0.5	+3 0
0.5	1.5	+3 0
1.5	3.0	+4 0
3.0	5.0	+5 0
5.0	8.0	+5 0
8.0	12.0	+6 0

NOTE 1 For GO gauges the above tolerances are relative to the low limit of the minor diameter of the nut. For NOT GO gauges the above tolerances are relative to the high limit of the minor diameter of the nut.
NOTE 2 GO plain plug gauges are not normally required for Whitworth and B.A. threads.
NOTE 3 For sizes above 4 in cylindrical-ended bar gauges are, in general, preferable to plug gauges, but care should be taken when using them to avoid distortion of thin-walled workpiece.

Figure 7 **General GO screw ring and GO thread calliper gauges**

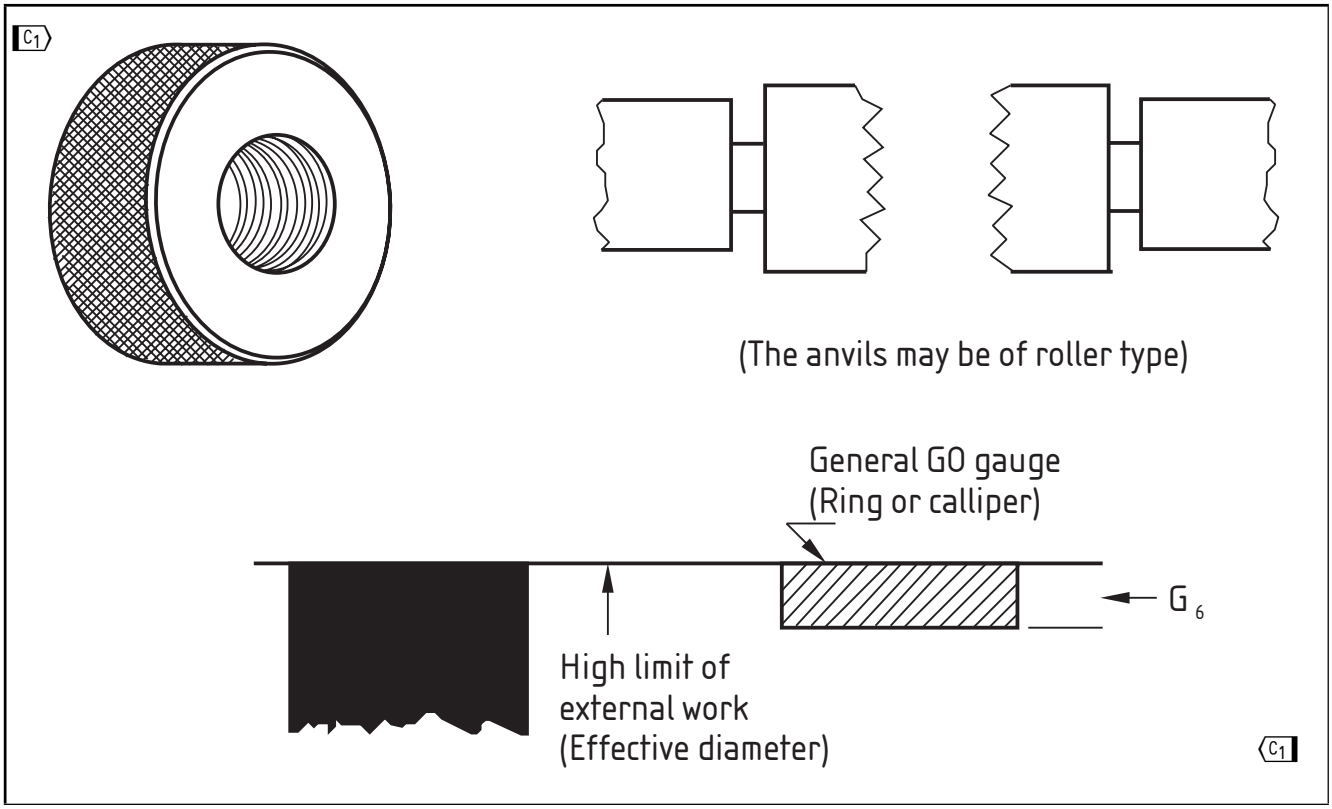


Table 5 **Tolerances for General GO screw ring and GO thread calliper gauges**

Unit = in × 0.000 1

Nominal size of gauge		**Major diameter**	**Effective diameter** (G_6, Figure 7)						**Minor diameter**
Above	**Up to and including**		**Any pitch**	**56–22 t.p.i.**	**20–13 t.p.i.**	**12–8 t.p.i.**	**7 and 6 t.p.i.**	**5–4 t.p.i.**	
in	in								
	0.1	+3 −5	−5						0 −5
0.1	0.5	+3 −6		−6	−6	−7			0 −6
0.5	1.5	+4 −7		−7	−8	−8	−8		0 −7
1.5	3.0	+4 −8		−8	−8	−9	−9	−10	0 −8
3.0	5.0	+5 −9			−9	−10	−11	−12	0 −9
5.0	8.0	+5 −10			−10	−11	−12	−12	0 −10
8.0	12.0	+6 −12				−12	−12	−13	0 −12

NOTE Both the effective diameter and the virtual effective diameter, i.e. the effective diameter as reduced by the effective diameter equivalent of pitch and angle errors, should lie within the tolerance zone G_6.
(See Figure 7 and Annex C.)

Figure 8 **NOT GO effective diameter ring gauges and thread calliper gauges**

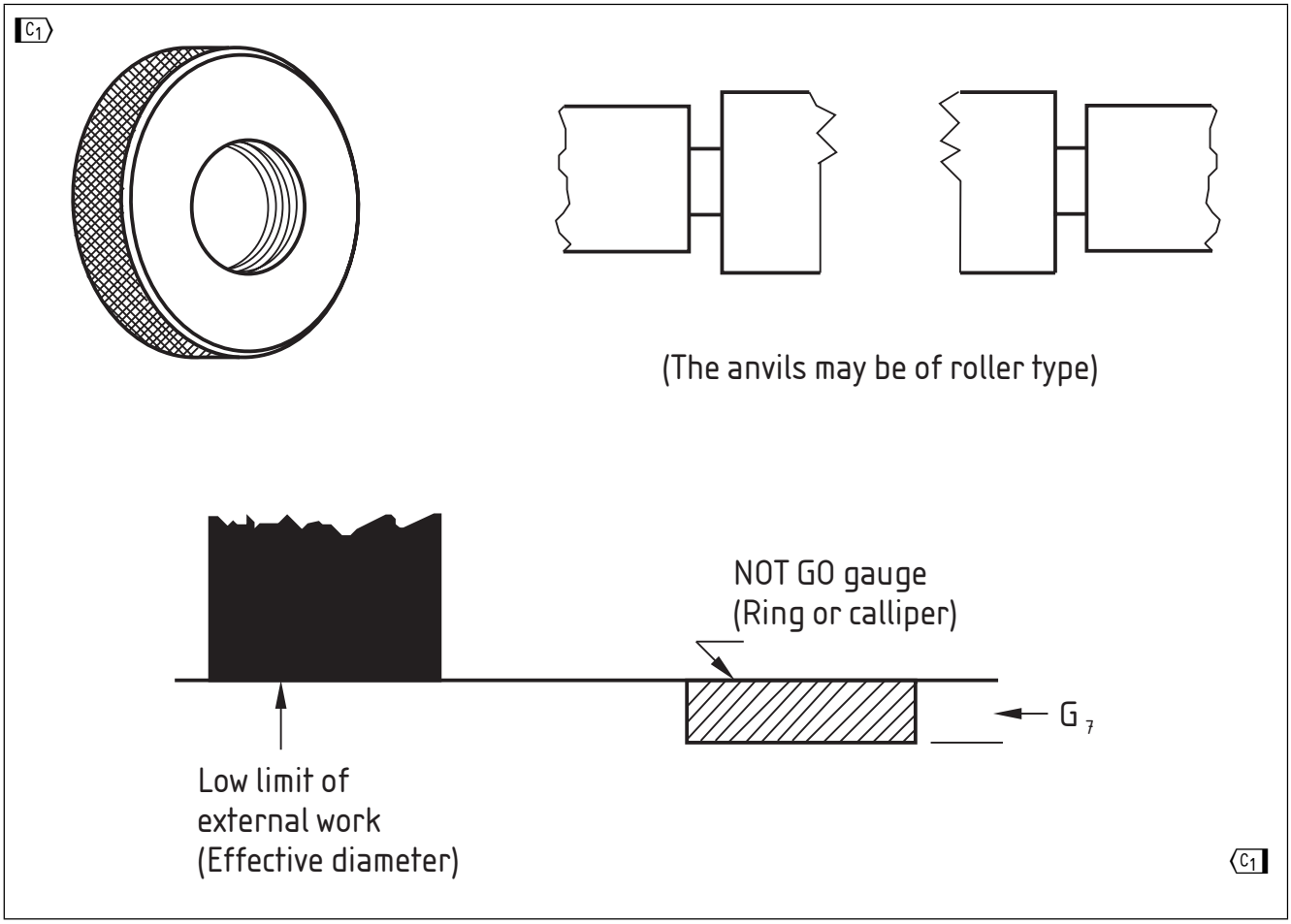


Table 6 **Limits of tolerance for NOT GO effective diameter ring gauges and thread calliper gauges (All classes of workpiece)**

Unit = in × 0.000 1

Nominal size of gauge		**Effective diameter** (G_7, Figure 8)					
Above	**Up to and including**	**Any pitch**	**56–22 t.p.i.**	**20–13 t.p.i.**	**12–8 t.p.i.**	**7 and 6 t.p.i.**	**5–4 t.p.i.**
in	in						
	0.1	−4					
0.1	0.5		−5	−5	−5		
0.5	1.5		−5	−6	−6	−6	
1.5	3.0		−6	−6	−7	−7	−8
3.0	5.0			−7	−8	−8	−9
5.0	8.0			−8	−8	−9	−9
8.0	12.0				−9	−9	−10

NOTE Both the effective diameter and the virtual effective diameter, i.e. the effective diameter as reduced by the effective diameter equivalent of any angle error, should lie within the tolerance zone G_7. (See Figure 8 and Annex C.)

Figure 9 **GO and NOT GO plain calliper (GAP) gauges for major diameters**

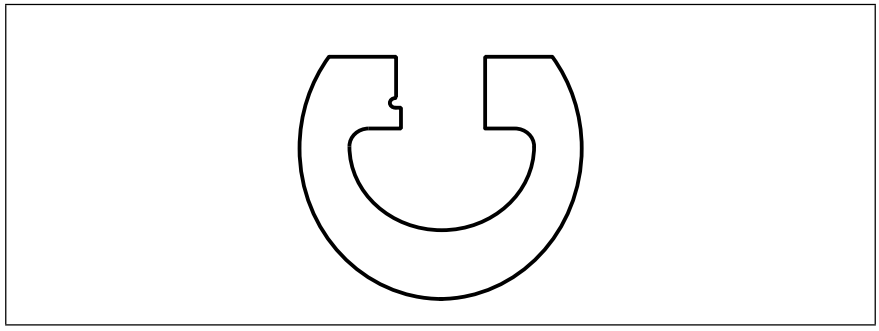


Table 7 **Tolerances for GO and NOT GO plain calliper (GAP) gauges for major diameters (All classes of workpiece)**

Unit = in × 0.000 1

Nominal size of gauge		**Tolerances on width of gap**
Above	**Up to and including**	
in	in	
	0.1	0 −2
0.1	0.5	0 −3
0.5	1.5	0 −3
1.5	3.0	0 −4
3.0	5.0	0 −5
5.0	8.0	0 −5
8.0	12.0	0 −6

NOTE 1 For GO gauges the above tolerances are relative to the high limit of the major diameter of the bolt. For NOT GO gauges the above tolerances are relative to the low limit of the major diameter of the bolt.
NOTE 2 GO plain calliper gauges are not normally required for Whitworth and B.A. threads.

Figure 10 **General setting plugs for thread calliper or adjustable screw ring gauges**

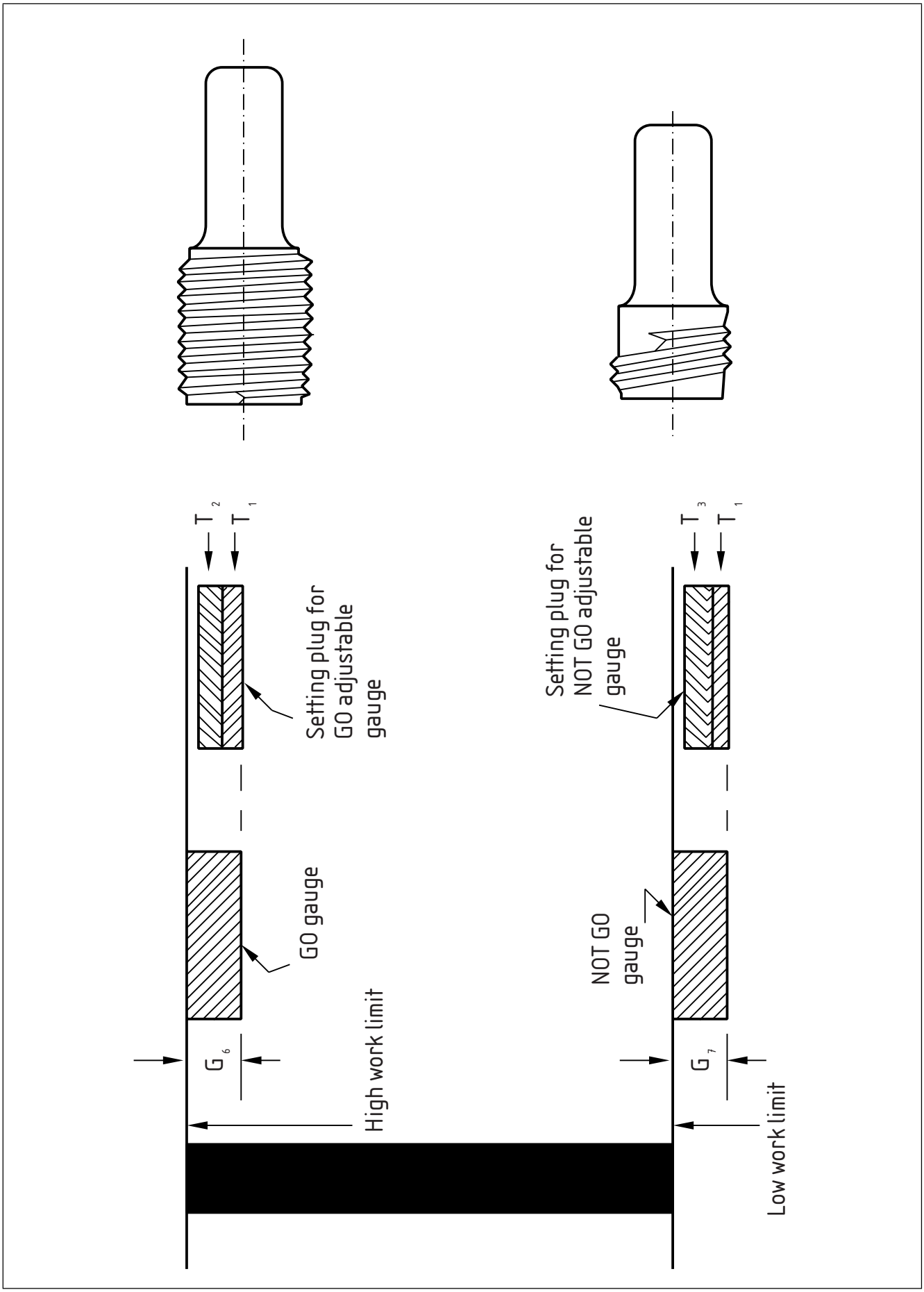


Table 8 **Limits of tolerance for General setting plugs for thread calliper or adjustable screw ring gauges**

Unit = in × 0.000 1

Size of setting plug—nominal major diameter of GO gauge		**Setting plug for GO gauge**		**Setting plug for NOT GO gauge**	
Above	**Up to and including**	**Effective diameter** (T_1, Figure 10)	**Effective diameter equivalent of pitch and angle errors** (T_2, Figure 10)	**Effective diameter** (T_1, Figure 10)	**Effective diameter equivalent of angle errors** (T_3, Figure 10)
in	in				
	0.1	+2 0	2	+2 0	2
0.1	0.5	+2 0	3	+2 0	2
0.5	1.5	+2 0	3	+2 0	2
1.5	3.0	+3 0	4	+3 0	3
3.0	5.0	+4 0	5	+4 0	3
5.0	8.0	+4 0	5	+4 0	4
8.0	12.0	+5 0	6	+5 0	4

NOTE The above tolerances for effective diameter are relative to the minimum effective diameter of the calliper or ring gauge.

Figure 11 **Reference settings plugs for GO thread calliper or adjustable screw ring gauges**

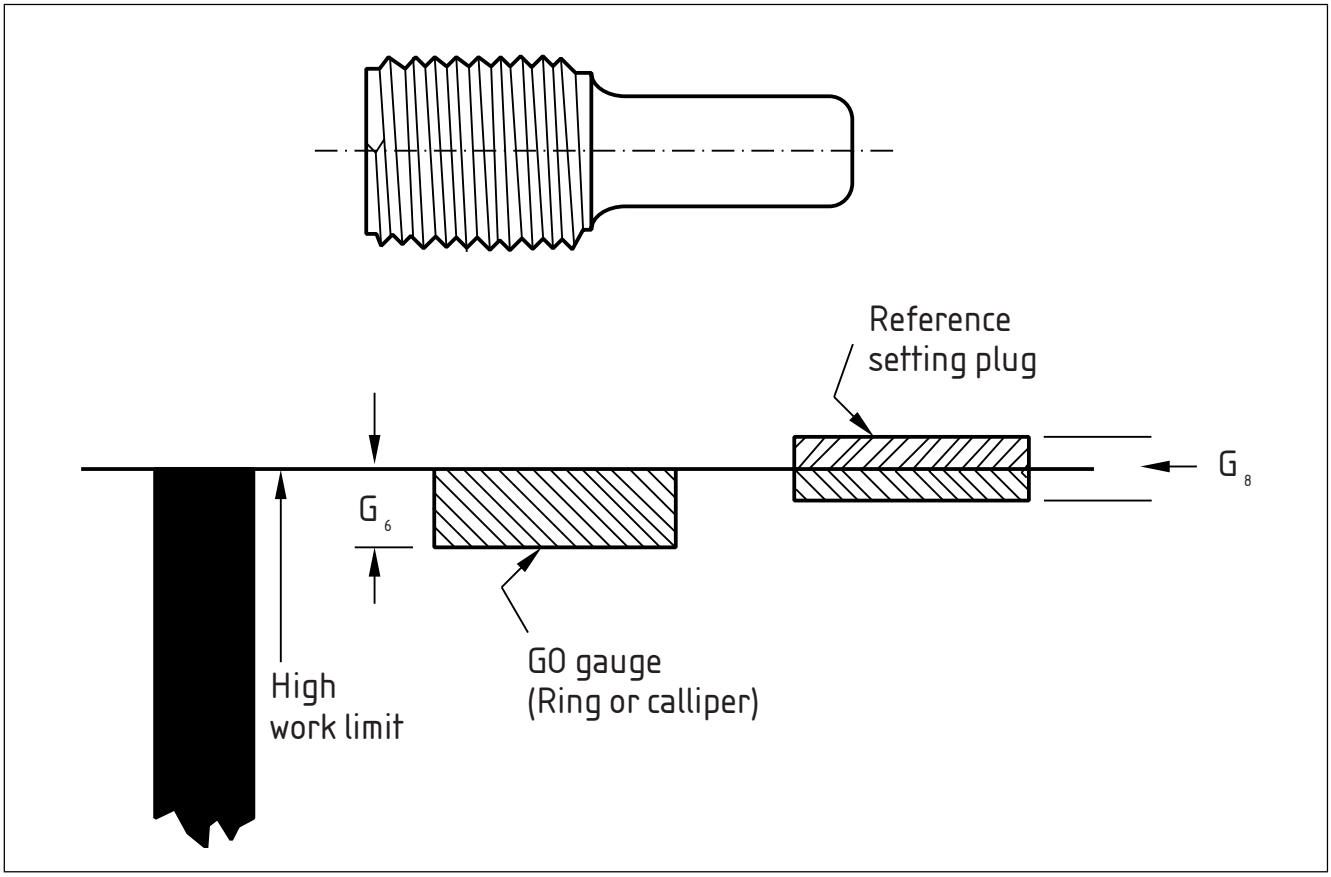


Table 9 **Limits of tolerance for Reference setting plugs for GO thread calliper or adjustable screw ring gauges**

Unit = in × 0.000 1

Size of setting plug – nominal major diameter of GO gauge		**Effective diameter – all pitches)** ($\pm\frac{1}{2}$ G_8, Figure 11)
Above	**Up to and including**	
in	in	
	0.1	±1.5
0.1	0.5	±1.5
0.5	1.5	±2
1.5	3.0	±3
3.0	5.0	±3.5
5.0	8.0	±4
8.0	12.0	±5

NOTE 1 The above tolerances are relative to the high limit of the effective diameter of the bolt.
NOTE 2 Both the effective diameter and the virtual effective diameter, i.e. the effective diameter, as increased by the effective diameter equivalent of pitch and angle errors, should lie within the tolerance zone G_8.
(See Figure 11 and Annex C.)

Annex A (informative) Function and method of use of various gauge types

A.1 Gauges for internal screw threads

A.1.1 GO screw plug gauge

This gauge checks that the virtual effective diameter and the major diameter of the product thread are not smaller than the minimum limits specified. It does not check the minimum minor diameter of the product thread since, for practical reasons, the root of the plug gauge has to be cleared.

The minor diameter is examined separately by means of a GO plain plug gauge made to the minimum minor diameter of the internal thread. It has to be possible to screw the GO screw plug gauge by hand, without using excessive force, into the complete length of the product thread. This gauge does not take account of any eccentricity between the crest and flank diameters of the internal product thread which might affect assembly. Any such eccentricity can be identified using a GO screw plug gauge provided with a pilot GO plain plug, the diameter of which is made to the minimum minor diameter of the internal thread. This ensures that:

- the effective diameter of the external thread does not exceed the maximum size specified for it; and
- the external thread will assemble with an internal thread having a minimum minor diameter.

Such a gauge does not ensure that the major diameter of the external thread is not too large since, for practical reasons, the root of the ring gauge has to be cleared.

The major diameter is examined separately by means of a GO plain calliper gauge made to the maximum major diameter of the external thread (see **A.2.3**). Here again any eccentricity between the crest and flank diameters of the thread will not be detected by the GO gauge. The amount of any eccentricity present is most readily determined by means of optical projection.

Since its purpose is to ensure, as far as possible, assembly of mating threads, a GO screw gauge should be perfect form and equal to the maximum metal size of the products being inspected.

NOTE When, for reasons of economy, standard gauge blanks are used in the manufacture of the gauge, the length of the gauge might be less than the length of engagement of the product threads. Suitable precautions have therefore to be taken when using the gauge.

A.1.2 NOT GO screw plug gauge

This gauge checks that the maximum effective diameter of the product thread is not too large. Ideally it should not be possible for the gauge to enter the product thread but, as internal threads are often slightly bell-mouthed, it is permissible to allow entry provided that, on withdrawal, disengagement takes place within two full turns of thread. If the product has a length of thread of three turns or less, the gauge should not screw completely through the product thread. The gauge should be applied by hand without using excessive force.

A.1.3 GO and NOT GO plain plug gauges

These gauges check that the minor diameter of the product thread is between its specified limits. The GO plain plug gauge should assemble completely with the product thread. The NOT GO plain plug gauge may enter the product thread by not more than a distance of two full turns of the thread. If the product has a length of thread of three turns or less, the NOT GO gauge should not pass completely through the product thread.

A.2 Gauges for external screw threads

A.2.1 Solid or adjustable GO screw ring gauge

This gauge checks that the virtual effective diameter of the product thread is not too large. The major and minor diameters of the product thread are not checked by this gauge. It should be possible to screw the gauge by hand, without using excessive force, over the complete length of the product thread.

A.2.2 Solid or adjustable NOT GO screw ring gauge

This gauge checks that the effective diameter of the product thread is not too small. Ideally it should not be possible for the product thread to enter the gauge but, as external threads are often slightly tapered at the leading end, it is permissible to allow entry provided that, on withdrawal, disengagement takes place within two full turns of thread. If the product has a length of thread of three turns or less the gauge should not screw completely on to the product thread. The gauge should be applied by hand without using excessive force.

A.2.3 Adjustable GO screw calliper gauge

This gauge is intended to check that the virtual effective diameter of the product thread is not too large. The major and minor diameters of the product thread are not checked by this gauge. The gauge is generally applied to the product thread under its own weight or in accordance with a fixed working load at three positions at least evenly spaced around the circumference of the thread. The gauge should pass completely over the product thread at any of the positions at which it is applied.

A.2.4 Adjustable NOT GO screw calliper gauge

This gauge checks that the effective diameter of the product thread is not too small. It is generally applied to the product thread under its own weight or under a fixed working load at three positions evenly spaced around the circumference of the thread. The gauge should not pass over the product thread except possibly for the first two turns of thread.

A.2.5 GO and NOT GO plain ring or calliper gauges

These gauges check that the major diameter of the product thread is between the specified limits. The gauges are applied to the product thread under the same conditions as the corresponding screw gauges.

A.2.6 Setting plugs (double length) for adjustable GO and NOT GO screw ring gauges

These setting plugs are used to set adjustable screw ring gauges to the specified effective diameters. Each setting plug has a length of thread approximately equal to twice the length of the screw ring gauge to be controlled. The effective diameter of the setting plug is constant throughout, but half the length of the setting plug has a full form thread and the remaining half has a truncated form of thread. The screw ring gauge is adjusted to be a snug fit on the full form portion of the setting plug. The setting plug is then unscrewed by hand, without using excessive force, through the screw ring gauge until the truncated portion of the setting plug completely engages the screw ring gauge. In the latter condition there should be no perceptible shake or play between the setting plug and the screw ring gauge: shake or play is an indication of an unacceptable error of thread form of the adjustable screw ring gauge.

A.2.7 Setting plugs (single length) for adjustable GO and NOT GO screw calliper gauges

These setting plugs are used to set the adjustable screw calliper gauges, and are approximately equal in length to the gauges. The setting plugs for the GO and NOT GO screw calliper gauges have full form threads. A calliper gauge is adjusted so that it just passes over the appropriate setting plug under its own weight or under a fixed working load.

For any given product size, setting plugs for calliper gauges are made slightly smaller in effective diameter than the corresponding setting plugs for adjustable ring gauges. This difference in size permits the results obtained by a calliper gauge to be compared with those obtained with an adjustable ring gauge.

Single-length setting plugs provide little help in detecting any error in thread form caused by wear of the calliper gauge anvils, so it is necessary to examine periodically for such error by other means.

A.2.8 Screw check plugs for new solid GO and NOT GO screw ring gauges

These screw check plugs are used to check that the effective diameters of screw ring gauges are within the specified limits. It should be possible to screw the GO check plug by hand completely through the appropriate screw ring gauge. The NOT GO check plug, when screwed by hand without excessive force, may be allowed to enter both ends of the screw ring gauge provided that, on withdrawal, disengagement takes place within one full turn of thread.

When setting a new calliper gauge with the setting plugs discussed in **A.2.7**, an additional check should be made with the NOT GO check plug for the corresponding new screw ring gauge. The latter check may also be applied to a used calliper gauge to ensure that the thread form is not worn. The wear check plug for the screw ring gauge should not be used as a wear check plug for the calliper gauge.

A.2.9 Plain check plugs for new solid GO and NOT GO screw ring gauges

These check plugs are used to verify that the minor diameter of a screw ring gauge is between the specified limits. A GO check plug should assemble completely with the screw ring gauge. A NOT GO check plug may enter both ends of the screw ring gauge by not more than a distance of one turn.

A.2.10 NOT GO screw wear check plugs for used solid GO and NOT GO screw ring gauges

These wear check plug gauges are used to check that the appropriate solid screw ring gauges have not worn beyond the specified limits of wear.

A wear check plug gauge, when screwed by hand without excessive force, may be allowed to enter both ends of the screw ring gauge provided that, on withdrawal, disengagement takes place within one full turn of thread.

A.3 Check gauges

GO and NOT GO screw check gauges verify that new solid type ring gauges are within limits. They correspond to the GO and NOT GO screw plug gauges used for testing the product but are made to much finer tolerances. They serve as an alternative to direct measurement in the testing of ring gauges above, say, $\frac{1}{4}$ inch in diameter. Check gauges are indispensable for sizes smaller than $\frac{1}{4}$ inch in diameter, which is about the limit of size for direct measurement.

NOT GO effective diameter checks also ensure that solid GO ring gauges are not allowed to remain in service after they have worn by a specific amount.

A.4 Use of screw gauges

It is not necessary for all the different types of screw gauges described in **A.1** and **A.2** to be used for checking external threads on products, but it is essential for one of the types of GO screw gauges and one of the types of NOT GO screw gauges to be used.

NOTE General GO gauges are intended for use both in the production and inspection all classes of threaded workpiece, except the following:

– Whitworth, BS 84 Close fit;

– BSC, BS 811 Close class.

A solid or adjustable GO screw ring gauge should always be used for gauging the maximum effective diameter of an external thread but, to save time in checking, a GO screw calliper gauge may be employed. Gauging with GO screw calliper gauges should be supplemented by random sampling with a GO screw ring gauge to give greater assurance that parts outside the limits are not accepted. In cases of dispute, gauging with the GO screw ring gauge is decisive. The GO screw calliper gauge should *not* be used if the manufacturing process is likely to introduce errors in the product thread which this gauge is not certain to detect, e.g. lobing, local pitch errors in milled threads and burrs at the start of the thread. Furthermore, the GO screw calliper gauge is not

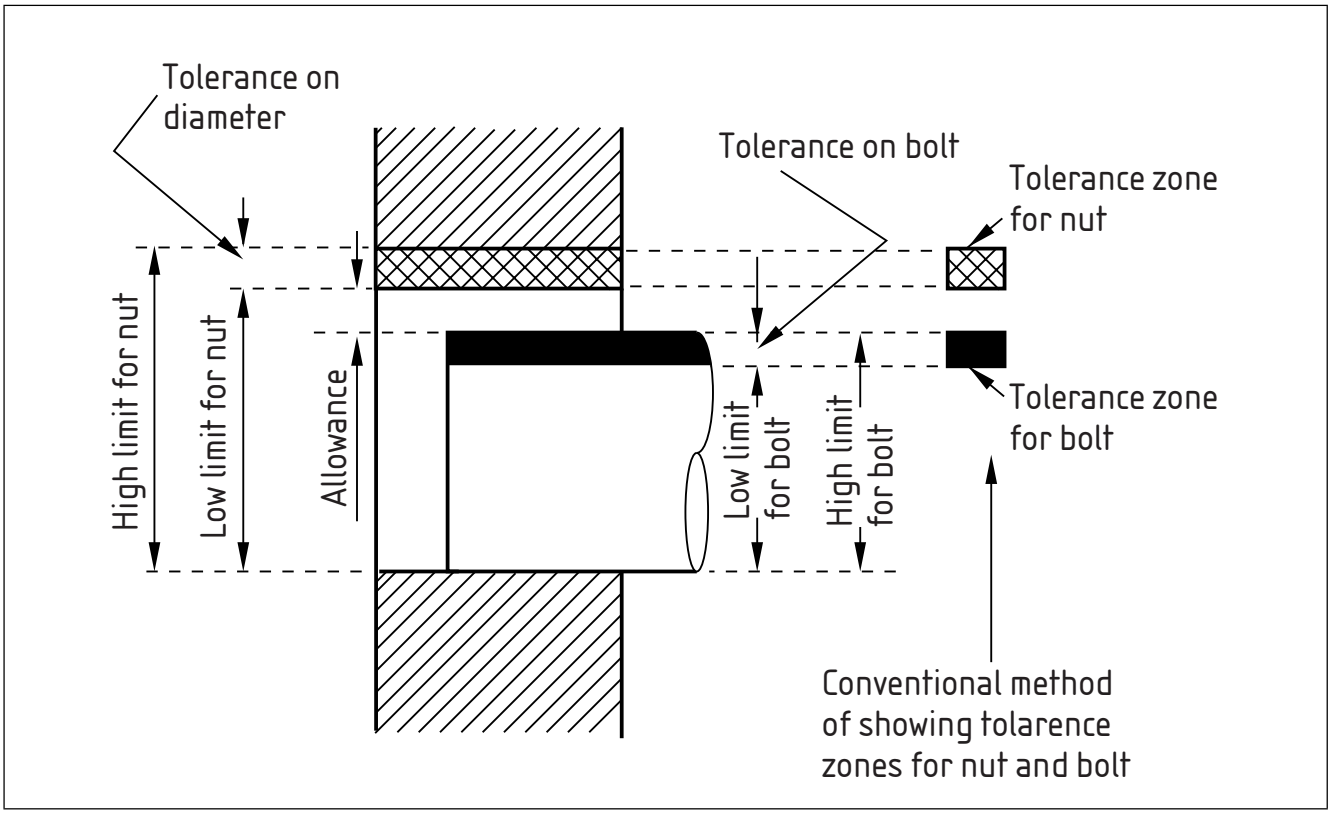
suitable for checking non-rigid, e.g. thin-walled, parts which would deform when the gauge is applied; in such cases a GO screw ring gauge should be used.

For large screw threads (over about 100 mm diameter) the size to which the GO screw calliper gauge is set may be reduced to compensate for the effect of form errors that may occur in these threads; this reduces the possibility of accepting screw threads that are outside the specified limits.

A NOT GO screw calliper gauge should be used to check the minimum effective diameter of an external thread. The solid or adjustable NOT GO screw ring gauge should only be used to check non-rigid product threads, e.g. those on thin-walled parts which would deform if a NOT GO screw calliper were applied.

Annex B (informative) Conventional illustration of tolerance zones

Figure B.1 **Diagram showing limits and tolerances for the effective diameters of a nut and its mating bolt**



The left hand portion of Figure B.1 illustrates diagrammatically the limits and tolerances for the effective diameter of a nut and its mating bolt. For convenience, the pitch cylinders of nut and bolt are drawn in contact at the bottom so that the whole of the tolerance on each mating part is shown at the top. The tolerance zone for the effective diameter of the nut is shown by the cross-hatched area and that for the effective diameter of the bolt by the black area.

In diagrams used to illustrate the dispositions of tolerance zones it is customary and convenient to show only the upper portion of the above diagram, reducing it to the form shown on the right hand of the figure. This convention has been adopted in Figure B.1 for showing the effective diameter tolerance zones for the workpiece, and the same convention has been followed in that figure for showing the effective diameter tolerance zones for the gauges, setting plugs, etc.

Annex C (informative) Effective diameter equivalent of pitch and angle errors

C.1 The effective diameter of a screw plug gauge can best be defined as the value of its effective diameter obtained by measuring with thread-measuring cylinders, the diameters of which are so chosen as to make contact at or very close to the pitch line of the gauge. Similarly, the effective diameter of a screw ring gauge is the effective diameter measured with ball-ended feeler points, which make contact at or very close to the pitch line of the gauge.

C.2 The measurement of the effective diameter of a screw plug or screw ring gauge takes no account of any errors present in the pitch or angle of the gauge. These errors cause a plug to behave as if its effective diameter were larger than the measured diameter and make a ring behave as if its effective diameter were smaller than the measured diameter, by an amount depending upon the magnitude of the errors.

The magnitudes of these pitch and angle errors have therefore to be restricted to reasonable amounts and the simplest method of doing so is to fix a maximum value for the equivalent of the two errors combined (or if only angle error is concerned, as in the case of NOT GO gauges, the equivalent of angle error only) in terms of the effective diameter of the gauge. These permissible maximum values are shown in the tolerance tables.

C.3 The effective diameter equivalent of errors in pitch and angle can be calculated from the following simple formulae:

for Whitworth threads:

$$\delta E = (1.92 \times \delta p) + 0.010\,5 \times p\,(\delta\theta_1 + \delta\theta_2)$$

for BSC threads:

$$\delta E = (1.75 \times \delta p) + 0.007\,4 \times p\,(\delta\theta_1 + \delta\theta_2)$$

for B.A. threads:

$$\delta E = (2.27 \times \delta p) + 0.009\,1 \times p\,(\delta\theta_1 + \delta\theta_2)$$

where:

δp is maximum error in the relative displacement of any two threads along the gauge,

$\delta\theta_1$ and $\delta\theta_2$ are errors in the slopes of the opposite flanks of the thread in degrees, regardless of sign,

δE is effective diameter equivalent of the above errors in the pitch and angles of the gauge.

C.4 Table C.1, Table C.2, Table C.3 and Table C.4 give the calculated effective diameter equivalents of various pitch and angle errors for gauges having Whitworth, B.A. and BSC threads.

When the errors in pitch and angle of a gauge have been measured, the combined effective diameter equivalent is obtained by adding together the equivalent value obtained from Table C.1 and that from Table C.2, Table C.3 and Table C.4.

In the case of a screw plug gauge or setting plug, the value thus obtained should not exceed the permissible value given in the respective tolerance table.

NOTE *If a gauge has no pitch error, the whole of the tolerance on the effective diameter equivalent might be absorbed by angle error and vice versa.*

C.5 Screw ring and thread calliper gauges are usually tested with check gauges which automatically take account of pitch and angle errors. No separate tolerance for the equivalent of pitch and angle error is therefore recommended. If ring gauges are tested by direct measurement, the maximum effective diameter equivalent of pitch and angle errors that can be permitted is obtained by subtracting from the effective diameter tolerance given in the table (ignore sign) the amount by which the measured effective diameter is below its upper limit.

Example If a 1 in × 14 t.p.i. GO screw ring gauge measures 0.000 3 in below its upper limit of effective diameter, the maximum effective diameter equivalent of pitch and angle errors permissible is:

0.000 8 in − 0.000 3 in = 0.000 5 in.

Table C.1 **Effective diameter equivalents of errors in pitch**

Unit = in × 0.000 1

Maximum cumulative error in pitch of gauge	**Effective diameter equivalent**		
	Whitworth threads	**BSC threads**	**B.A. threads**
in			
0.000 05	1.0	0.9	1.1
0.000 1	1.9	1.7	2.3
0.000 15	2.9	2.6	3.4
0.000 2	3.8	3.5	4.5
0.000 25	4.8	4.3	5.7
0.000 3	5.8	5.2	
0.000 35	6.7	6.1	
0.000 4	7.7	6.9	
0.000 45	8.6	7.8	

Table C.2 **Effective diameter equivalents of errors in angle for Whitworth threads**
Angle 55°

Errors in angle to nearest 0.1 degree [A)]																							**Effective diameter equivalent** in × 0.000 1
0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	1
0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.8	2
0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.1	3
0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.1	1.1	1.2	1.3	1.4	1.5	4
0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.9	5
0.2	0.3	0.3	0.3	0.4	0.5	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.1	1.1	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.3	6
0.3	0.3	0.3	0.4	0.5	0.5	0.6	0.7	0.7	0.8	0.9	1.1	1.2	1.3	1.3	1.5	1.6	1.7	1.9	2.0	2.1	2.3	2.4	2.7	7
0.3	0.3	0.4	0.5	0.5	0.6	0.7	0.8	0.8	0.9	1.1	1.2	1.4	1.4	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	3.0	8
4	4.5	5	6	7	8	9	10	11	12	14	16	18	19	20	22	24	26	28	30	32	34	36	40	Threads per inch

[A)] Sum of errors in the slopes of the opposite flanks *regardless of their signs*.

Example. Screw 10 threads per inch. Flank angles measure 27.0° and 27.8°. Sum of errors regardless of sign is 0.5° + 0.3° = 0.8°. The effective diameter equivalent is found from the table to be 0.000 8 in.

Table C.3 **Effective diameter equivalent of errors in angle for B.A. threads**
Angle $47\frac{1}{2}°$

Errors in angle to nearest 0.1 degree [A)]															**Effective diameter equivalent** in × 0.000 1
0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1
0.6	0.6	0.7	0.8	0.8	0.9	1.1	1.2	1.3	1.4	1.6	1.8	2.0	2.2	2.4	2.7	2
0.8	0.9	1.0	1.1	1.3	1.4	1.6	1.7	1.9	2.1	2.4	2.7	3.0	3.3	3.6	4.0	3
1.1	1.2	1.4	1.5	1.7	1.9	2.1	2.3	2.6	2.9	3.2	3.6	4.0	4.5	4.9	5.3	4
1.4	1.6	1.7	1.9	2.1	2.4	2.6	2.9	3.2	3.6	4.0	4.5	5.0	5.6	6.1	6.6	5
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	B.A. No.

[A)] Sum of errors in the slopes of the opposite flanks *regardless of their signs*.

Example. Screw No. 3BA. Flank angles measure 24.1° and 23.3°. Sum of errors regardless of sign is 0.4° + 0.4° = 0.8°. The effective diameter equivalent is found from the table to be 0.000 2 in.

Table C.4 **Effective diameter equivalents of errors in angle for BSC threads**

Angle 60°

Errors in angle to nearest 0.1 degree [A]							**Effective diameter equivalent** in × 0.000 1
0.3	0.4	0.4	0.4	0.5	0.6	0.8	1
0.6	0.7	0.8	0.9	1.1	1.2	1.5	2
1.0	1.1	1.2	1.3	1.6	1.8	2.3	3
1.3	1.4	1.6	1.7	2.2	2.4	3.0	4
1.6	1.8	2.0	2.2	2.7	3.0	3.8	5
1.9	2.1	2.4	2.6	3.2	3.6	4.5	6
24	26	30	32	40	44	56	Threads per inch.

[A] Sum of errors in the slopes of the opposite flanks *regardless of their signs*.

Example. Screw 24 t.p.i. Flank angles measure 31.0° and 29.4°. Sum of errors regardless of sign is 1.0° + 0.6° = 1.6°. The effective diameter equivalent is found from the table to be 0.000 5 in.

Annex D (normative) Thread form of NOT GO effective diameter gauges

The forms of thread for NOT GO effective diameter gauges shall be as shown in Figure D.1 and Figure D.2. Type I is recommended for pitches of 20 t.p.i. (1.25 mm) and coarser, and is optional for finer pitches. Type II is an alternative for pitches finer than 20 t.p.i. (1.25 mm).

Plug and ring gauges	**Tolerance**
1) Width of recess, $P/3$	$\pm 0.02P$
2) Symmetry of recess	d_1 not to differ from d_2 by more than $0.04H$
3) Truncated major diameter of plug gauges for all fits or classes of nuts = basic effective diameter (effective diameter of minimum nut) + $H/3$	$+0$ $-0.02H$
4) Truncated minor diameter of ring gauges for all fits or classes of bolts = basic effective diameter (effective diameter of minimum nut) – $H/3$	$+0.02H$ -0
Calliper gauge anvils	
5) Distance of crest from pitch line on NOT GO anvils of caliper gauges = ⟦C1⟩ $h_a = H/6 - g/2$ ⟨C1⟧ where g is the tolerance on effective diameter of bolt	$+0$ $-0.01H$ (with a minimum of 0.000 3)
6) Depth of truncation of NOT GO anvils of calliper gauges from basic form, R	$+0$ $-0.01H$ (with a minimum of 0.000 3)

For Whitworth threads: $R = (H/6 + g/2)$

For B.A. threads: $R = (0.11P + g/2)$

For BSC threads: $R = (0.122P + g/2)$

To avoid a multiplicity of anvils the value to be substituted for g in 5) and 6) shall be the maximum tolerance for the particular pitch concerned which is tabulated in BS 84. Anvils so made will also serve for the "Special threads" tabulated in the British Standard.

Alternatively, for a single purpose calliper, the value taken for g may be the effective diameter tolerance for the particular size and grade of bolt concerned.

A thread calliper gauge shall be set to size by means of a threaded setting plug. It is not necessary, however, to have separate setting plugs corresponding to the different grades or classes of bolt. A calliper which has been set, for example, to "Close fit" limits by means of a setting plug can subsequently be re-adjusted to a "Free fit" setting by the use of a slip gauge.

To facilitate calculations, values of $P/3$, $0.02P$, $H/3$, $0.02H$, etc. for standard series of threads are tabulated in Table D.1, Table D.2 and Table D.3.

Table D.1 **Whitworth threads**

t.p.i.	***P*/3**	**0.02*P***	***H*/3**	**0.02*H***	**t.p.i.**	***P*/3**	**0.02*P***	***H*/3**	**0.02*H***
	in	in	in	in		in	in	in	in
40	0.008 3	0.000 5	0.008 0	0.000 5	14	0.023 8	0.001 4	0.022 9	0.001 4
36	0.009 3	0.000 5	0.008 9	0.000 5	12	0.027 8	0.001 7	0.026 7	0.001 6
32	0.010 4	0.000 6	0.010 0	0.000 6	11	0.030 3	0.001 8	0.029 1	0.001 7
28	0.011 9	0.000 7	0.011 4	0.000 7	10	0.033 3	0.002 0	0.032 0	0.001 9
26	0.012 8	0.000 8	0.012 3	0.000 7	9	0.037 0	0.002 2	0.035 6	0.002 1
24	0.013 9	0.000 8	0.013 3	0.000 8	8	0.041 7	0.002 5	0.040 0	0.002 4
22	0.015 2	0.000 9	0.014 6	0.000 9	7	0.047 6	0.002 9	0.045 7	0.002 7
20	0.016 7	0.001 0	0.016 0	0.001 0	6	0.055 6	0.003 3	0.053 4	0.003 2
19	0.017 5	0.001 1	0.016 9	0.001 0	5	0.066 7	0.004 0	0.064 0	0.003 8
18	0.018 5	0.001 2	0.017 8	0.001 1	$4\frac{1}{2}$	0.074 1	0.004 4	0.071 1	0.004 3
16	0.020 8	0.001 3	0.020 0	0.001 2	4	0.083 3	0.005 0	0.080 0	0.004 8

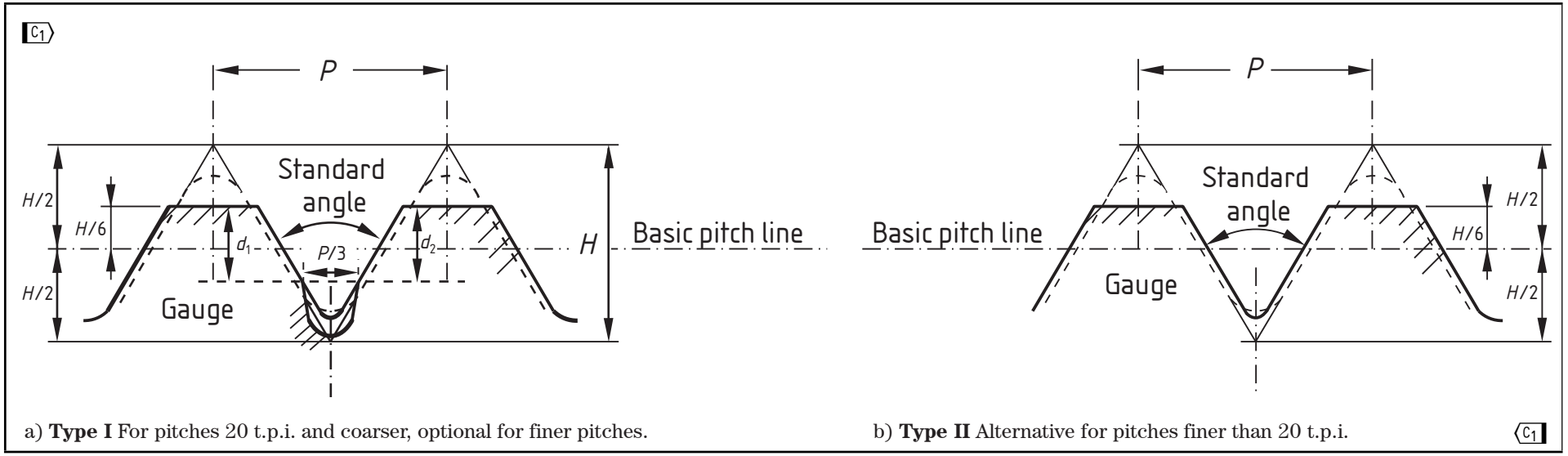
Table D.2 **BSC threads**

t.p.i.	***P* /3**	**0.02*P***	**0.122*P***	***H*/3**	**0.02*H***
	in	in	in	in	in
56	0.006 0	0.000 4	0.002 2	0.005 2	0.000 3
44	0.007 6	0.000 5	0.002 8	0.006 6	0.000 4
40	0.008 3	0.000 5	0.003 1	0.007 2	0.000 4
32	0.010 4	0.000 6	0.003 8	0.009 0	0.000 5
30	0.011 1	0.000 7	0.004 1	0.009 6	0.000 6
26	0.012 8	0.000 8	0.004 7	0.011 1	0.000 7
24	0.013 9	0.000 8	0.005 1	0.012 0	0.000 7

Table D.3 **B.A. threads**

B.A.	***P*/3**	**0.02*P***	**0.11*P***	***H*/3**	**0.02*H***
No.	in	in	in	in	in
0	0.013 1	0.000 8	0.004 3	0.014 9	0.000 9
1	0.011 8	0.000 7	0.003 9	0.013 4	0.000 8
2	0.010 6	0.000 6	0.003 5	0.012 1	0.000 7
3	0.009 6	0.000 6	0.003 2	0.010 9	0.000 7
4	0.008 7	0.000 5	0.002 9	0.009 8	0.000 6
5	0.007 7	0.000 5	0.002 6	0.008 8	0.000 5
6	0.007 0	0.000 4	0.002 3	0.007 9	0.000 5
7	0.006 3	0.000 4	0.002 1	0.007 2	0.000 4
8	0.005 6	0.000 3	0.001 9	0.006 4	0.000 4
9	0.005 1	0.000 3	0.001 7	0.005 8	0.000 3
10	0.004 6	0.000 3	0.001 5	0.005 2	0.000 3

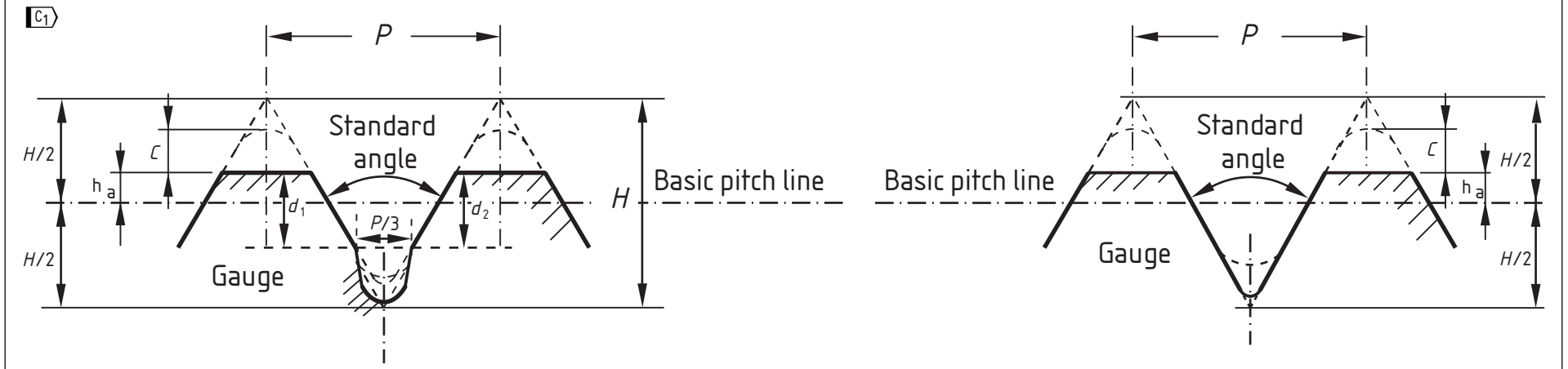
Figure D.1 **Forms of thread for NOT GO effective diameter screw gauges: Plug and ring gauges**



a) **Type I** For pitches 20 t.p.i. and coarser, optional for finer pitches.

b) **Type II** Alternative for pitches finer than 20 t.p.i.

Figure D.2 **Calliper gauge anvils**



$h_a = (H/6 - g/2)$
where g = tolerance on effective diameter of bolt

a) **Type I** For pitches 20 t.p.i. and coarser, optional for finer pitches.

b) **Type II** Alternative for pitches finer than 20 t.p.i.

NOTE (Figure D.1 and Figure D.2). The roots of the gauge-thread are cleared in the manner indicated to avoid contact with the crests of the thread of a nut which, while being large on effective diameter, may have a minor diameter on the low limit; or, in the case of ring or calliper gauges, with the crests of a bolt which, while being small on effective diameter, may have a major diameter on the high limit. The crests of the gauge-thread are truncated in the manner indicated to avoid contact with the roundings at the roots of the nut or bolt under corresponding maximum metal conditions at root.

Annex E (informative) Hardness

A steel gauge should be hardened to the value most appropriate to its type, size and pitch and to the steel from which it is made.

Experience has shown that if the hardness of steel gauges is kept within the range 650 HV to 800 HV (57 HRC to 62 HRC) the threads do not easily burr nor are they brittle.

Experience has also shown that the gauging surfaces of plain plug and calliper gauges should be hardened within the range 750 HV to 850 HV (61 HRC to 63 HRC).

Bibliography

[C1] Standards publications

BS 811, *Specification for cycle threads* [C1]

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