

BRITISH STANDARD

Screw gauge limits and tolerances –

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

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This Part of BS 919 supersedes BS 919-2:1971, which is withdrawn.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

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*

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

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 $\boxed{C_1}$ screw $\boxed{C_1}$ 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.

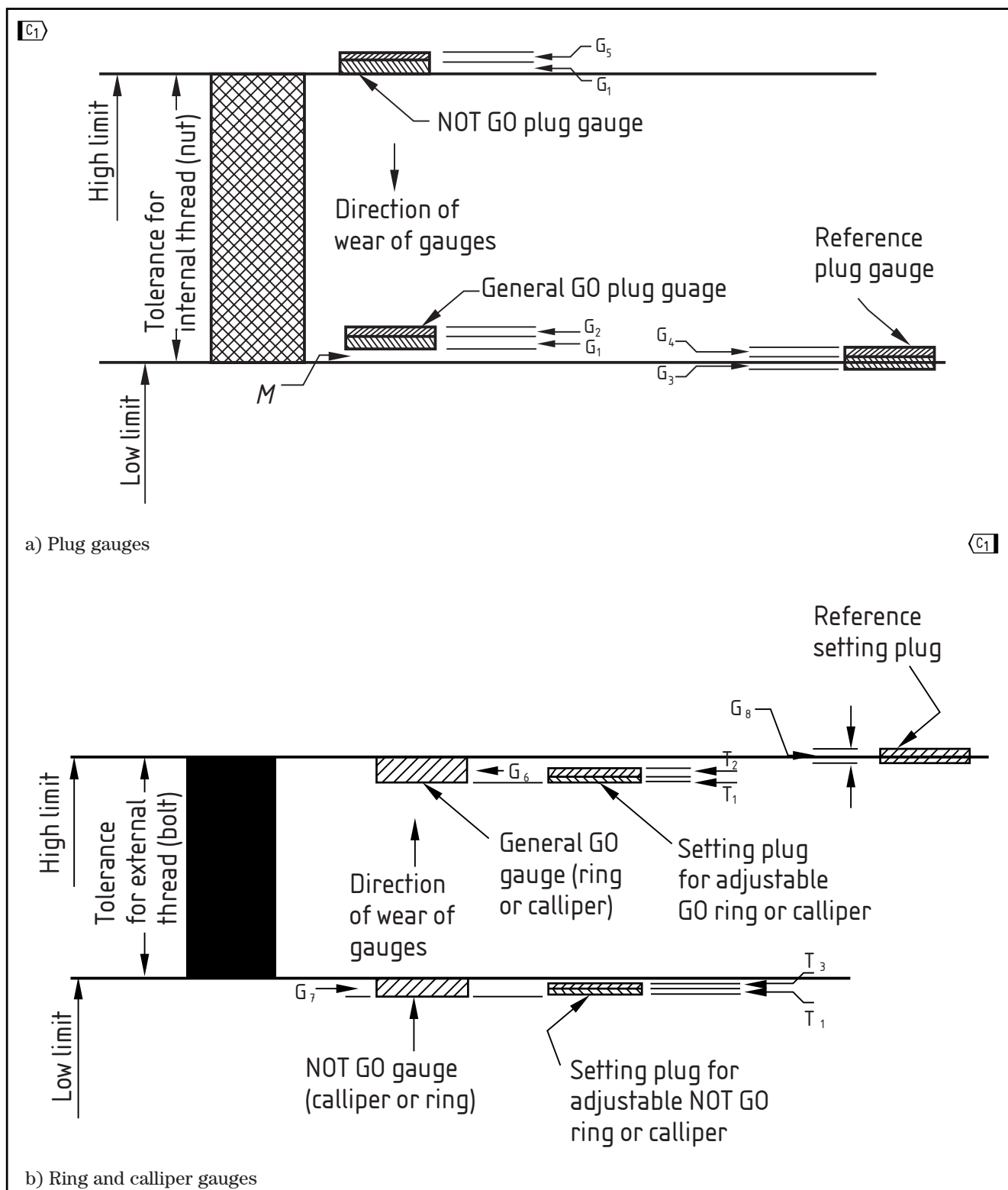
NOTE Wear causes NOT GO gauges to become gradually less accurate in the inspection of the workpieces.

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.