

BRITISH STANDARD

Screw gauge limits and tolerances –

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

ICS 21.040.10

Publishing and copyright information

The BSI copyright notice displayed in this document indicates when the document was last issued.

© BSI 2009

ISBN 978 0 580 68658 0

The following BSI references relate to the work on this standard:

Committee reference TDW/4

Draft for comment 07/30158517 DC

Publication history

First published December 1968

Second edition, October 2007

Amendments issued since publication

Amd. no.	Date	Text affected
C1	30 September 2009	See foreword

Contents

Foreword *iii*

- 1** Scope *1*
- 2** Normative references *1*
- 3** Terms and definitions and symbols *1*
- 4** General design features and tolerances of gauges *2*
- 5** Marking *4*

Annexes

- Annex A (informative) Function and method of use of various gauge types *27*
- Annex B (informative) Inspection procedures and the settlement of disputes *31*
- Annex C (informative) Reference temperature *32*
- Annex D (informative) Hardness *32*

Bibliography *33*

List of figures

- Figure 0 – “Blunt start” at end of thread on gauge *5*
- Figure 1 – Thread profiles for screw plug, ring and calliper gauges having complete flanks *6*
- Figure 2 – Thread profiles for screw plug, ring and calliper threads of truncated form *8*
- Figure 3 – Alternative form of GO calliper gauge anvil for product threads having pitches finer than 0.5 mm *10*
- Figure 4 – Alternative form of NOT GO calliper gauge anvil for product threads having pitches finer than 1.0 mm *10*
- Figure 5 – Effective diameter tolerance zones of gauges for external product threads having pitch diameter tolerances above 80 µm and up to 125 µm *12*
- Figure 6 – Effective diameter tolerance zones of gauges for external product threads having pitch diameter tolerances above 200 µm and up to 315 µm *13*
- Figure 7 – Effective diameter tolerance zones of gauges for internal product threads having pitch diameter tolerances above 80 µm and up to 125 µm *14*
- Figure 8 – Effective diameter tolerance zones of gauges for internal product threads having pitch diameter tolerances above 200 µm and up to 315 µm *15*

List of tables

- Table 1 – Dimensions of root clearances of GO screw gauges (see Figure 1) *7*
- Table 2 – Dimensions of root clearances of NOT GO screw gauges (see Figure 2) *9*
- Table 3 – Flank angle tolerances *11*
- Table 4 – Pitch tolerances *11*
- Table 5 – External product thread deviations for effective diameters of GO screw limit gauges and their associated check plugs and setting plugs *16*
- Table 6 – External product thread deviations for effective diameters of NOT GO screw limit gauges and their associated check plugs and setting plugs *16*

Table 7 – Internal product thread deviations and allowable wear for effective diameters of GO and NOT GO screw limit gauges and their associated check plugs and setting plugs 17

Table 8 – Deviations for minor diameters of new GO and NOT GO screw ring gauges, major diameters of new GO and NOT GO screw plug gauges, and plain check plugs for new screw ring gauges 18

Table 9 – Deviations for major diameters of screw check plugs and setting plugs for GO screw ring and calliper gauges 19

Table 10 – Deviations for major diameters of screw check plugs and setting plugs for NOT GO screw ring and calliper gauges 20

Table 11 – External product thread deviations and allowable wear for GO and NOT GO plain calliper and ring gauges 20

Table 12 – Internal product thread deviations and allowable wear for GO and NOT GO plain plug gauges 21

Table 13 – External product thread information for calculation of limits for new solid GO screw ring gauges and their associated check plugs 22

Table 14 – External product thread information for calculation of limits for adjustable GO screw ring and calliper gauges and their associated setting plugs 23

Table 15 – External product thread information for calculation of limits for new solid NOT GO screw ring gauges and their associated check plugs 24

Table 16 – External product thread information for calculation of limits for adjustable NOT GO screw ring and calliper gauges and their associated setting plugs 25

Table 17 – Internal product thread information for calculation of limits for GO and NOT GO screw plug gauges 26

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iii, a blank page, pages 1 to 33 and a back cover.

Foreword

This British Standard is published by BSI and came into effect on 31 October 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 919-3:1968, which is withdrawn.

NOTE Attention is drawn to the fact that, for reasons of economy, this standard provides for wear limits for some GO gauges which are outside those of the product thread.

Relationship with other publications

This British Standard is intended for use with BS 3643, 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 types of gauges for checking ISO metric screw threads of nominal diameter 1 mm and larger made in accordance with BS 3643.

a) Screw gauges:

- 1) GO and NOT GO screw plug gauges;
- 2) GO and NOT GO screw ring gauges, solid type;
- 3) GO and NOT GO screw ring gauges, adjustable type;
- 4) GO and NOT GO screw calliper gauges, adjustable type.

b) GO and NOT GO plain plug gauges and GO and NOT GO calliper and ring gauges for the crest diameters of product threads.

c) Setting plugs for GO and NOT GO adjustable screw ring gauges and for GO and NOT GO screw calliper gauges:

- 1) double length;
- 2) single length.

d) GO and NOT GO check plug gauges for solid type GO and NOT GO screw ring gauges.

e) NOT GO wear check plug gauges for solid type GO and NOT GO screw ring gauges.

Annex A provides guidance on the functions and methods of use of the various types of gauges and Annex B recommends a procedure for the settlement of disputes arising when borderline products are inspected. Guidance on the hardness of gauges is given in Annex C, and Annex D provides information on the reference temperature.

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 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 basic profile

theoretical profile of a screw thread in an axial plane defined by theoretical dimensions and angles common to internal and external threads

NOTE This definition is repeated from BS 6528:1984 for the convenience of users of this standard.

3.2 Symbols

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

b	maximum width of clearance groove
D	basic major diameter of internal thread (nominal diameter)
D_1	basic minor diameter of internal thread
D_2	basic pitch diameter of internal thread
d	basic major diameter of external thread (nominal diameter)
d_1	basic minor diameter of external thread
d_2	basic pitch diameter of external thread
d_3	minor diameter of external thread
H	height of fundamental triangle
P	pitch
r	root radius of external thread
T	tolerance
T_{D1}	tolerance for D_1
T_{D2}	tolerance for D_2
T_{d1}	tolerance for d_1
T_{d2}	tolerance for d_2

4 General design features and tolerances of gauges

4.1 Dimensions of gauges

The general dimensions of gauges shall conform to BS 1044-1, subject to any special requirements in 4.2 to 4.7. For normal purposes, the length of thread shall be determined by the length of the gauge blank.

4.2 Thread profiles of screw gauges

NOTE The various types of screw gauges have full flank or truncated thread profiles.

Nominal full flank profiles for screw plug, ring and calliper gauges shall be as shown in Figure 1a) and Figure 1b). The corresponding truncated thread profiles shall be as shown in Figure 2a) and Figure 2b).

The maximum widths b_1 and b_2 of the clearance grooves shall be as shown on the full flank profiles in Figure 1a) and Figure 1b) and specified in Table 1. No clearance grooves need be provided on full flank profiles provided the flanks are continued to clear width b_1 or b_2 as appropriate, but the root shall be radiused as shown. Maximum values for r_1 and r_2 shall be as specified in Table 1. For fine pitches (below 1.25 mm on ring gauges and 0.6 mm on plug gauges) it is not practicable to provide separate clearance grooves.

The forms of the clearance grooves and crest truncations on gauges with truncated profiles shall be as shown in Figure 2a) and Figure 2b). F_1 , F_2 and b_3 shall be as specified in Table 2. The form of root clearance is optional but it may not be displaced in relation to the centre of the profile by more than $S = 0.05P$ (see Note to Table 2).

Alternative forms of GO and NOT GO calliper gauge anvils for product threads having fine pitches shall be as shown in Figure 3 and Figure 4, respectively.

4.3 Flank angle and pitch tolerances on screw gauges

The flank angle tolerances for gauges having full flank threads and truncated threads respectively shall be as specified in Table 3.

The pitch tolerances for gauges shall be as specified in Table 4.

4.4 Disposition of effective diameter tolerance zones of gauges

The positions of the effective diameter tolerance zones of the GO and NOT GO screw gauges, setting plugs and various check plugs shall be as shown in relation to the effective diameter limits of the product threads in Figure 5 to Figure 8.

4.5 Diametral tolerances on screw gauges

Limits of tolerance (upper and lower deviations) for the effective diameters of the various types of gauges shall be as specified in Table 5 to Table 7.

Limits of tolerance for the crest diameters of the various types of gauges shall be as specified in Table 8 to Table 10.

4.6 Tolerances on plain gauges

4.6.1 Limits of tolerance (upper and lower deviations) for GO and NOT GO plain calliper and ring gauges shall be as specified in Table 11 and, for GO and NOT GO plain plug gauges, as specified in Table 12.

4.6.2 Limits of tolerance for GO and NOT GO plain check plugs for the minor diameters of solid GO and NOT GO screw ring gauges shall be as specified in Table 8. These tolerances shall be applied to the appropriate deviations for the minor diameter of the screw ring gauge.

4.7 Determination of gauge limits

The screw gauge limits can be calculated using the information summarized in Table 13 to Table 17 inclusive.

4.8 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 (see Figure 0), except for:

- a) screw plug gauges and setting plugs in sizes below 4 mm and/or with external core centres;
- b) screw ring gauges of 12 mm nominal size and smaller or with pitches of 1.25 mm and finer, and all screw plug gauges and setting plugs with pitches of 1 mm 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 1 mm and coarser, the feather edge shall be completely removed where the truncated portion meets the full form portion.

4.9 Dirt clearance grooves

When specified by the purchaser, a screw plug gauge shall have a dirt clearance groove cut axially 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 its full section as described in 4.8.

4.10 Removal of sharp edges

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

5 Marking

Each gauge shall be plainly and permanently marked with the minimum marking essential for positive identification.

Unless otherwise specified by the purchaser, each gauge shall be marked with the following particulars:

- a) the designation of the corresponding product thread in accordance with BS 3643;

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

- b) the size of the gauge, i.e. the limiting size of the product thread which the gauge is intended to control;
- c) “GO” or “NOT GO”, as applicable;
- d) “SET”, in the case of setting plugs for adjustable screw ring or calliper gauges;
- e) “CHECK”, in the case of check plugs for solid screw rings or calliper gauges;
- f) the manufacturer’s name or trade mark;
- g) a serial number if required for recording purposes.

The marking of plug gauges of the renewable end type shall, where practicable, appear on the face of the gauging member in addition to the handle.

Examples of marking for gauges

Class of gauge	Marking
GO screw plug	M8 × 1–6H, GO 7.350, X Co. No. 35
NOT GO screw plug	M8 × 1–6H, NOT GO 7.500, X Co. No. 3
Plain plugs for minor diameter	M8 × 1–6H, GO 6.917, X Co. No. 9
	M8 × 1–6H, NOT GO 7.153, X Co. No. 15
GO screw ring or calliper	M10 × 1.5–6g, GO 8.994, X Co. No. 56
NOT GO screw ring or calliper	M10 × 1.5–6g, NOT GO 8.862, X Co. No. 75
Plain callipers for major diameter	M10 × 1.5–6g, GO 9.968, X Co. No. 43
	M10 × 1.5–6g, NOT GO 9.732, X Co. No. 64
GO setting plug	M10 × 1.5–6g, GO SET 8.994, X Co. No. 24
NOT GO check plug	M10 × 1.5–6g, NOT GO CHECK 8.862, X Co. No. 97

Figure 0 “Blunt start” at end of thread on gauge

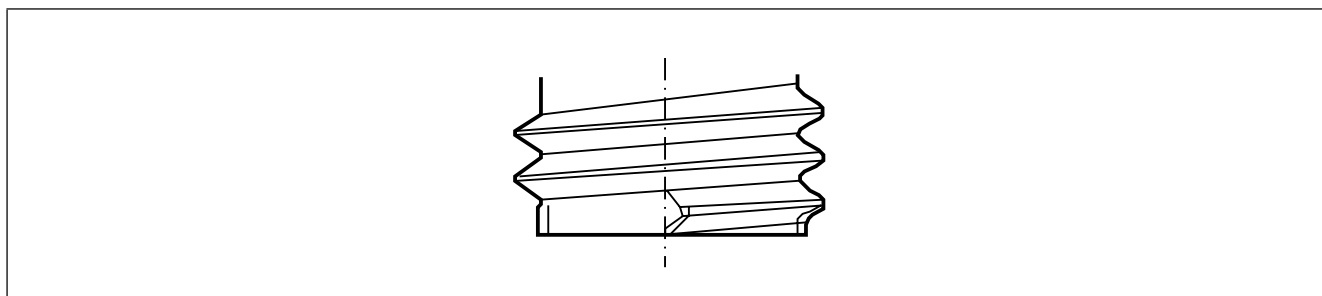


Figure 1 Thread profiles for screw plug, ring and calliper gauges having complete flanks

