BS 6468:2008

BSI British Standards

Specification for depth micrometers

raising standards worldwide™

BSI British Standards

Publishing and copyright information

ISBN 978 0 580 61996 0

ICS 17.040.30

The following BSI references relate to the work on this standard:
Committee reference TDW/4
Draft for comment 08/30177718 DC

Publication history

First published January 1984
Second edition November 2008

Amendments issued since publication

Amd. No.	Date	Text affected

Contents

Foreword *ii*
1 Scope *1*
2 Normative references *1*
3 Terms and definitions *1*
4 Design features *2*
5 Accuracy *5*
6 Marking *6*

Annexes
Annex A (normative) Methods of test for measuring face and datum face *7*
Annex B (informative) Notes on use *8*

Bibliography *9*

List of figures
Figure 1 – Spindle type S *1*
Figure 2 – Rod type R *2*
Figure 3 – Deviation from squareness of mean rod axis to datum face of type R depth micrometers *4*
Figure 4 – Position of reading end of thimble to barrel *5*
Figure A.1 – Example of error of traverse *7*

List of tables
Table 1 – Deviation of reading at minimum capacity *5*

Summary of pages
This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 10, 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 2008. It was prepared by Technical Committee TDW/4, *Technical product realization*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 6468:1984, which is withdrawn.

Information about this document

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

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 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 British Standard specifies requirements for spindle type S and rod type R depth micrometers with a micrometer traverse of 25 mm or 1 in, covering measuring capacities from 0 to 300 mm, or 1 in to 12 in.

Annex A gives methods of test. Advice on use is given in Annex B.

2 Normative references

The following referenced document is indispensable for the application of this document. The latest edition of the referenced document (including any amendments) applies.

BS 817, *Specification for surface plates*

3 Terms and definitions

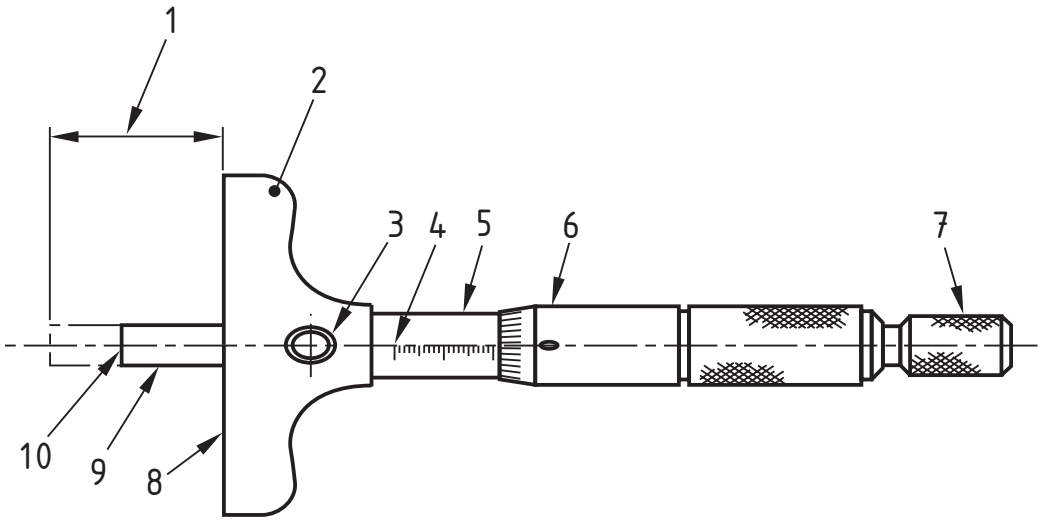
For the purposes of this British Standard, the following terms and definitions apply.

3.1 type S micrometer

micrometer having a single spindle and a measuring capacity of 0 mm to 25 mm or 1 in

NOTE Figure 1 illustrates a typical Type S (spindle) micrometer.

Figure 1 **Spindle type S**



Key

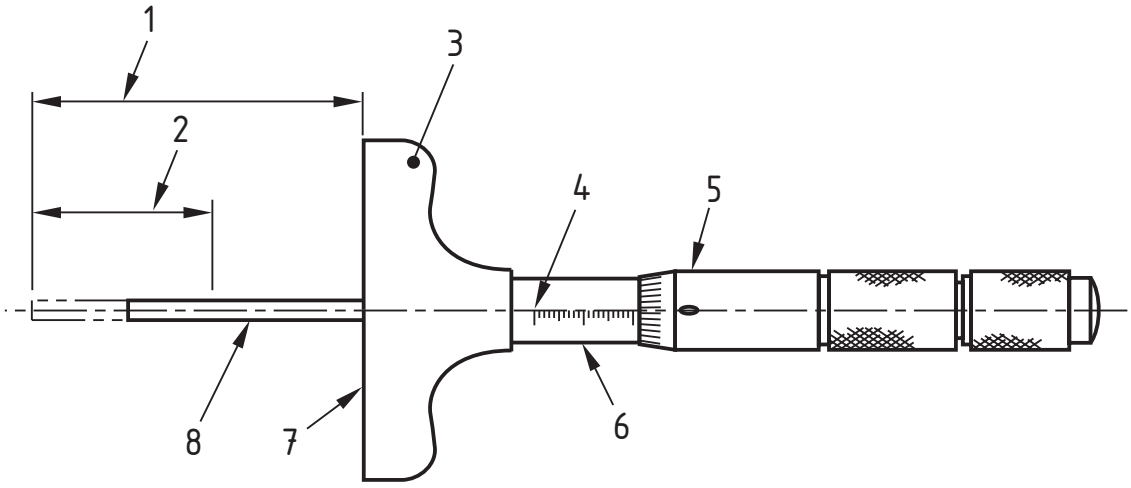
1	Measuring capacity	6	Thimble
2	Base	7	Ratchet drive (optional)
3	Spindle clamp (optional)	8	Datum face
4	Fidicual line	9	Spindle
5	Barrel	10	Measuring face

3.2 type R micrometer

micrometer having measuring capacities of 0 mm to 300 mm or 12 in, in increments of 25 mm or 1 in by means of a series of rods, the measuring faces of which are flat

NOTE Figure 2 illustrates a typical Type R (rod) micrometer.

Figure 2 **Rod type R**



Key

1	Measuring capacity	5	Thimble
2	Range	6	Barrel
3	Base	7	Datum face
4	Fidicual line	8	Extension rod

3.3 measuring capacity (type S)

range of depth which the instrument will measure using the traverse of the micrometer screw

3.4 measuring capacity (type R)

range of depth which the instrument will measure using the various rods together with the micrometer screw

3.5 deviation of reading

difference between the depth micrometer reading and the length at 20 °C between two parallel planes, one of which is contacted by the datum face and the other by the measuring face of the spindle or rod

4 Design features

4.1 Base

The base shall be made of steel, with at least 65 mm length of datum face. The shape shall permit measurement of depth at any point

in a circle of 25 mm diameter recessed at the maximum capacity of the depth micrometer. The datum face shall be hardened to not less than 600 HV, and all sharp edges shall be removed to a maximum of 0.5 mm or 0.02 in width of chamfer. The datum face shall have a surface texture less than 0.1 µm *Ra* or 4 µin *Ra* at a sampling length of 0.8 mm and shall be flat or concave by not more than 0.003 mm or 0.000 1 in.

4.2 Spindle and rods

4.2.1 Material

The spindle and rods shall be made of steel of hardness no less than 640 HV and shall be free from internal stresses.

4.2.2 Hardness

The hardness of the measuring faces shall be no less than 800 HV.

4.2.3 Flatness and surface texture

The measuring faces shall have a surface texture less than 0.1 µm *Ra* or 4 µin *Ra* at a sampling length of 0.8 mm and the flatness shall not exceed 0.001 mm or 0.000 05 in.

NOTE Spindle and rods may be tipped or coated on the measuring face with a wear resistant material.

When tested in accordance with **A.1**, there shall be no more than four circular interference bands.

Where the datum face is lapped, there shall be no more than ten circular interference bands.

4.2.4 Squareness

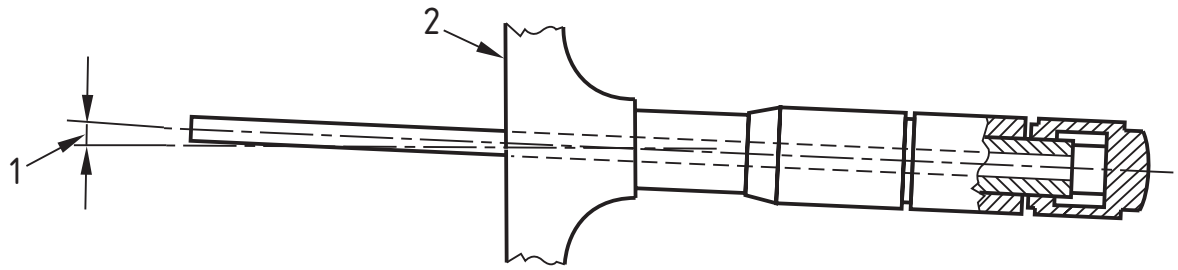
When tested in accordance with **A.2**, the measuring face shall be square to the axis of the spindle or rod within 0.003 mm or 0.000 1 in over the diameter of the face.

4.2.5 Assembly

4.2.5.1 For type S, when assembled, the measuring face of the spindle shall be parallel to the datum face at all positions within 0.003 mm or 0.000 1 in over its diameter. The cylindrical portion of the spindle shall be a free fit in its bearings with a lateral shake not exceeding 0.015 mm or 0.000 6 in measured within 4 mm of the datum face.

4.2.5.2 For type R, the axis of rotation of rods in the instrument shall be normal to the datum face within 0.08 mm per 25 mm or 0.003 in per in of projecting rod length. When an assembled rod is rotated the measuring face centre shall not deviate from its mean axial position by more than 0.025 mm for each 25 mm or 0.001 in per in of projecting rod length (see Figure 3).

Figure 3 **Deviation from squareness of mean rod axis to datum face of type R depth micrometers**



Key

1 Squareness of mean rod axis to base

2 Datum face

4.3 Micrometer screw

The micrometer screw shall have a lead of 0.5 mm or 0.025 in. Throughout the entire micrometer measuring traverse there shall be no less than 8 mm or 5⁄16 in engagement of screw with nut, and the axial play shall not exceed 0.008 mm or 0.000 3 in.

4.4 Thimble graduations

The thimble shall be graduated with 50 divisions for metric reading instruments, each representing 0.01 mm, or 25 divisions for inch reading instruments, each representing 0.001 in.

The diameter of the graduated edge of the thimble shall be no less than 11 mm or 7⁄16 in and the angle of the bevel shall be no more than 20°. The distance from the barrel to the thimble edge shall not exceed 0.4 mm or 0.015 in (see Figure 4). The graduation lines shall be uniform and clear, and of width not less than 0.10 mm or 0.004 in and not more than 0.20 mm or 0.008 in.

NOTE 1 The surfaces of the thimble and barrel should have a non-reflective finish, and the graduation lines should contrast with the finish for ease of reading.

NOTE 2 Vernier scales are not recommended for depth micrometers.

4.5 Assembly of micrometer with body

The spindle or rod and screw shall be lubricated with a thin, non-corrosive oil and in this condition the motion shall be free and smooth throughout the travel.

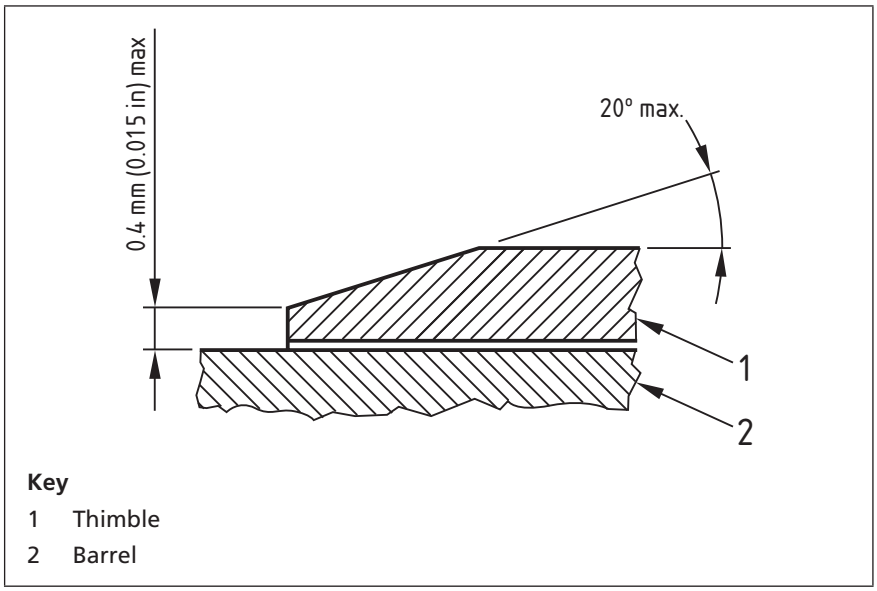
4.6 Spindle clamp

When a spindle clamp is fitted, it shall effectively lock the spindle without altering the reading by more than 0.003 mm or 0.000 1 in.

4.7 Adjustments

Provision shall be made for resetting the zero reading and for taking up wear between the screw and nut.

Figure 4 **Position of reading end of thimble to barrel**



Key
1 Thimble
2 Barrel

5 Accuracy

The maximum permissible deviation of reading at the minimum capacity of the instrument shall be as specified in Table 1.

When tested in accordance with **A.3**, the maximum error of traverse of the micrometer shall not exceed 0.005 mm or 0.000 2 in.

Table 1 **Deviation of reading at minimum capacity**

Metric		Imperial	
Measuring depth capacity	**Tolerance on deviation of reading at minimum capacity, plus or minus**	**Measuring depth capacity**	**Tolerance on deviation of reading at minimum capacity, plus or minus**
mm	mm	in	in
0-25 type S	0.003	0-1 type S	0.000 1
0-25 type R	0.006	0-1 type R	0.000 2
25-50	0.006	1-2	0.000 2
50-75	0.006	2-3	0.000 2
75-100	0.008	3-4	0.000 3
100-125	0.008	4-5	0.000 3
125-150	0.010	5-6	0.000 4
150-175	0.010	6-7	0.000 4
175-200	0.012	7-8	0.000 5
200-225	0.012	8-9	0.000 5
225-250	0.014	9-10	0.000 6
250-275	0.014	10-11	0.000 6
275-300	0.016	11-12	0.000 6

6 Marking

Each depth micrometer shall be legibly and permanently marked, in characters not less than 0.6 mm high, with the manufacturer's name or trade mark and country of manufacture.

NOTE It is recommended that type R rods be marked with their associated measuring capacity.

Annex A (normative) Methods of test for measuring face and datum face

A.1 Flatness

Test the measuring face for flatness by means of an optical flat. Clean the face thoroughly and bring the optical flat gently into contact with it.

When the contact is stabilized, either a general colouration or a few circular interference bands will be seen on the surface. The bands are more crisply defined if a mercury vapour light is used for illumination.

If the datum face is lapped, test it in the same way.

If the face is ground, test it by comparison with a Grade 0 granite surface plate in accordance with BS 817, using a dial test indicator (see BS 2795).

A.2 Squareness

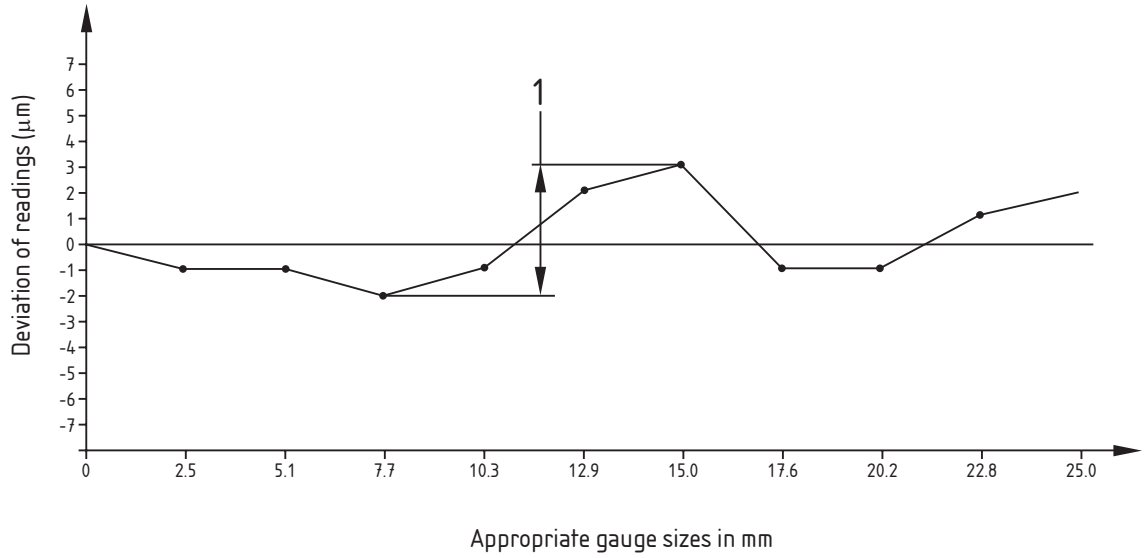
Test the squareness of the measuring face to the spindle or rod axis by observing the variations of its reflections as viewed by an autocollimator when the spindle or rod is rotated in a vee block.

A.3 Error of traverse of the micrometer

Support the datum face on two 25 mm gauge blocks on a Grade 0 surface plate.

Record the depth micrometer readings as the measuring face is used to contact a series of gauge blocks (see BS EN ISO 3650) from 0 mm to 25 mm (e.g. 2.5, 5.1, 7.7, 10.3, 12.9, 15.0, 17.6, 20.2, 22.8 and 25 mm) and plot the results in accordance with Figure A.1.

Figure A.1 **Example of error of traverse**



Key

1 Range of deviation of reading

Annex B (informative) Notes on use

B.1 The micrometer screw should be kept lightly lubricated with a thin oil and it should run without tightening or slackening during its traverse.

B.2 When a rod is fitted to a type R instrument, the seating on the rod and its associated seating in the body should be checked for cleanliness on a regular basis.

B.3 The measuring and datum faces should be kept clean.

B.4 The zero reading of the depth micrometer may be checked thus:

a) **Type R and type S, 0 mm to 25 mm**. Hold the datum face of the depth micrometer in contact with a Grade 0 granite surface plate and bring the measuring face gently into contact with the plate. Note the reading.

b) **Type R, greater than 25 mm (e.g. 25 mm to 50 mm)**. Use the datum face as a bridge across two 25 mm gauge blocks and note the reading when the measuring face gently contacts the surface plate.

NOTE Each rod gives a different minimum capacity to the depth micrometer and therefore has an individual zero reading.

Alternatively, the depth micrometer may be checked for deviation of reading at a particular dimension by holding the datum face to two equal gauge blocks of the nominal depth standing on a Grade 0 granite surface plate and noting the reading of the measuring face on the surface plate.

B.5 Accurate use of a depth micrometer depends upon firm contact of the datum face and gentle rotation of the thimble until the measuring face makes contact.

Bibliography

BS 870, *Specification for external micrometers*

BS 959, *Specification for internal micrometers (including stick micrometers)*

BS 1734, *Specification for micrometer heads*

BS 2795, *Specification for dial test indicators (lever type) for linear measurement*

BS EN ISO 3650, *Geometrical product specifications (GPS) — Length standards — Gauge blocks*

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level.

It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover.

Tel: +44 (0)20 8996 9000 Fax: +44 (0)20 8996 7400

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to BSI Customer Services.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001
Email: orders@bsigroup.com

You may also buy directly using a debit/credit card from the BSI Shop on the website **www.bsigroup.com/shop**

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library.

Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre.

Tel: +44 (0)20 8996 7111
Fax: +44 (0)20 8996 7048 Email: info@bsigroup.com

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.

Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001
Email: membership@bsigroup.com

Information regarding online access to British Standards via British Standards Online can be found at **www.bsigroup.com/BSOL**

Further information about BSI is available on the BSI website at **www.bsigroup.com**

Copyright

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/standards

raising standards worldwide™

British Standards