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BSI British Standards

Specification for external micrometers

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Publishing and copyright information

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C1	August 2009	Table 7 – Corrections to length of rod information

Contents

Summary of pages
This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 16, 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This British Standard supersedes BS 870:1950, which is withdrawn.

Relationship with other publications

EN ISO 3611, which specifies micrometer callipers for external measurements, is currently under development.

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 applies to the following types of external micrometers.

a) External micrometers having a frame holding a micrometer spindle and nut on one side opposite a fixed anvil on the other, with individual measuring ranges of: 0-13 mm; 25 mm (e.g. 0-25 mm, 25-50 mm, etc., up to 575-600 mm) and 0-½ in; 1 in (e.g., 0-1 in, 1-2 in, etc., up to 23-24 in).

b) External micrometers having a frame holding a micrometer spindle and nut on one side opposite an anvil on the other, and providing for two or more alternative ranges of measurement effected by means of interchangeable or sliding anvils, with individual measuring ranges of:

- 0-50 mm, 0-100 mm, 100-200 mm, 200-300 mm, 300-400 mm, 400-500 mm and 500-600 mm; or
- 0-2 in, 0-4 in, 4-8 in, 8-12 in, 12-16 in, 16-20 in and 20-24 in.

c) Setting gauges for micrometers above 25 mm or 1 in.

NOTE Attention is drawn to the fact that metric dimensions are not necessarily direct conversions of the imperial dimensions.

2 Material

For sizes up to 100 mm or 4 in the frame shall be of a suitable quality of steel. For sizes above 100 mm or 4 in and up to 300 mm or 12 in the frame may be of a suitable quality of steel or malleable cast iron. For sizes above 300 mm or 12 in the frame may be of a suitable quality of steel, malleable cast iron, or light alloy. It is recommended that suitable heat-insulating grips should be attached to the frame in convenient positions. It is further recommended that all micrometer frames should be suitably heat-treated to avoid any secular changes that might take place in the material.

NOTE Whilst the use of light alloys for the frames of micrometers over 300 mm or 12 in has the merit of lightness and so facilitates the handling of large micrometers, it should be noted that the coefficient of expansion of light alloys is appreciably greater than that of steel or malleable cast iron and that temperature changes in the frame, due to contact with the hands, can result in appreciable changes in the zero reading. This characteristic need not, however, detract from the accuracy of the readings if, during use, the micrometer is checked frequently against a standard length bar or setting gauge and the appropriate correction made to the reading.

The spindle and anvil shall be of high grade tool steel. The measuring faces of the spindle and anvil shall be hardened to give a diamond pyramid hardness number of not less than 800 (62 on the Rockwell C scale). The measuring faces may be tipped with tungsten carbide or other suitable hard material.

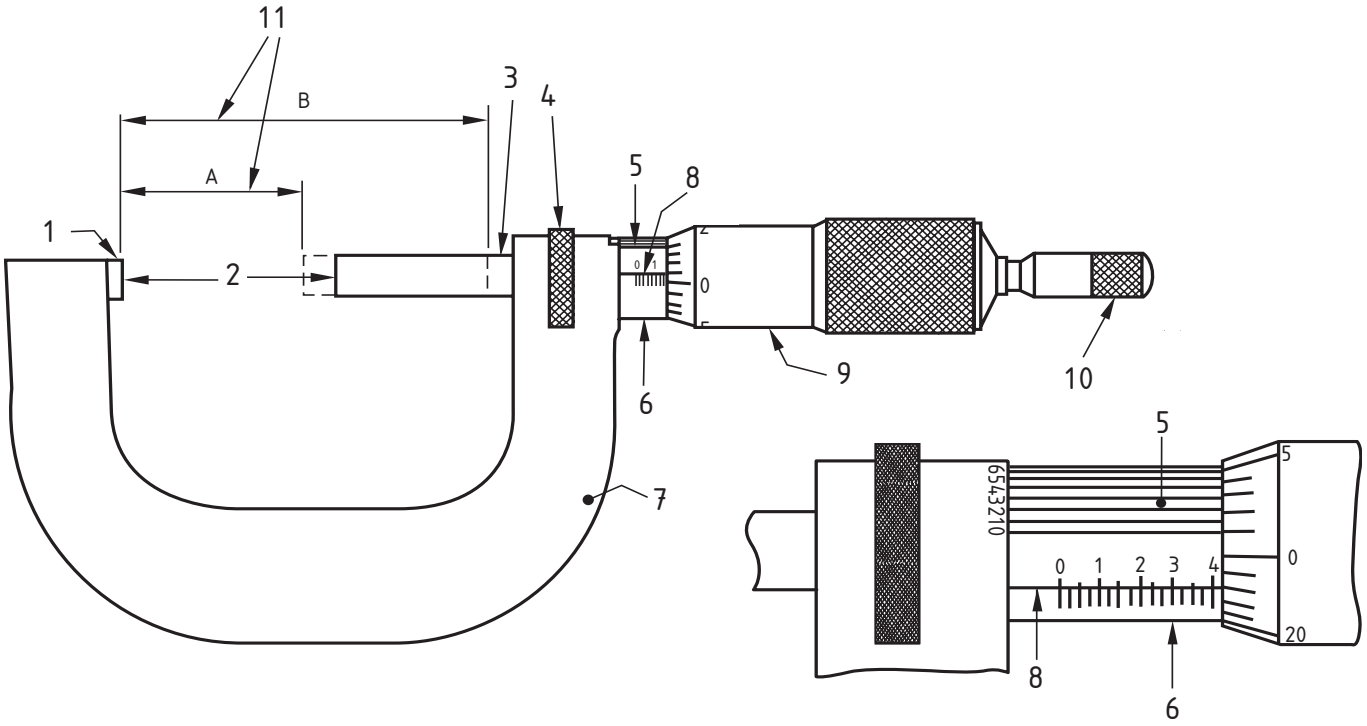
3 General design of frame

The frame shall be so shaped as to permit the measurement of a cylinder of diameter equal to the maximum capacity of the micrometer (see Figure 1 for an illustration of the components).

NOTE The design and finish of the frames of micrometers can vary and the design and finish required should be agreed and set out in the purchaser's specification (see Annex B).

The stiffness of the frame shall be such that a load of 1 kg or 2 lb mass applied between the measuring faces does not alter the distance between them by more than the amounts specified in Table 1 and Table 2.

Figure 1 **External micrometer components**



NOTE This figure is diagrammatic only, and is not intended to illustrate details of design.

Key (EN ISO 3611 terms given in parentheses)

1 Anvil
2 Measuring face
3 Spindle (Measuring spindle)
4 Spindle clamp
5 Vernier (Analogue indication)
6 Barrel (Sleeve)
7 Frame
8 Fiducial line
9 Thimble
10 Friction or ratchet drive (Fast drive)
11 Measuring range A-B

Table 1 **Permissible flexure of frame – metric readings**

Measuring range of micrometer			**Permissible flexure of frame under load of 1kg mass**
mm	mm	mm	mm
0-25	25-50	50-75	0.003
75-100	100-125	125-150	0.005
150-175	175-200	200-225	0.005
225-250	250-275	275-300	0.008
300-325	325-350	350-375	0.010
375-400	400-425	425-450	0.013
450-475	475-500	500-525	0.015
525-550	550-575	575-600	0.018

Table 2 **Permissible flexure of frame – inch readings**

Measuring range of micrometer			**Permissible flexure of frame under load of 2 lb mass**
in	in	in	in
0-1	1-2	2-3	0.000 1
3-4	4-5	5-6	0.000 2
6-7	7-8	8-9	0.000 2
9-10	10-11	11-12	0.000 3
12-13	13-14	14-15	0.000 4
15-16	16-17	17-18	0.000 5
18-19	19-20	20-21	0.000 6
21-22	22-23	23-24	0.000 7

4 Micrometer screw

The micrometer screw shall have a pitch of 0.5 mm or 1/40 in.

NOTE The threads of the screw and nut should be truncated so as to confine contact to the flanks of the thread.

5 Spindle

5.1 The front parallel portion of the spindle shall turn freely in its bush without perceptible shake. The spindle and screw shall be lubricated with a thin, light, non-corrosive oil and the spindle shall run freely and smoothly throughout the length of its travel. There shall be no perceptible backlash between the spindle screw and nut.

5.2 When the micrometer is at its maximum reading, there shall be full engagement of the nut and micrometer screw.

5.3 If a spindle clamp is fitted, the design shall be such that it effectively locks the spindle without altering the distance between the measuring faces by more than 0.003 mm or 0.0001 in.

5.4 If a friction or ratchet drive is fitted to the spindle, the pressure it exerts between the measuring faces shall lie between 0.7 kg or 1½ lb and 1.1 kg or 2¼ lb.

NOTE The purchaser should specify whether a spindle clamp and/or friction drive are required. If a pressure of less than 0.7 kg or 1½ lb is required this should be stated. (see Annex B).

6 Thimble and barrel

6.1 For 0-13 mm and 0-½ in micrometers, the diameter of the graduated edge of the thimble shall be no less than 9.6 mm or ⅜ in. For other micrometers, the diameter of the graduated edge of the thimble (Figure 2, dimension A) shall be no less than 11.2 mm or 7⁄16 in.

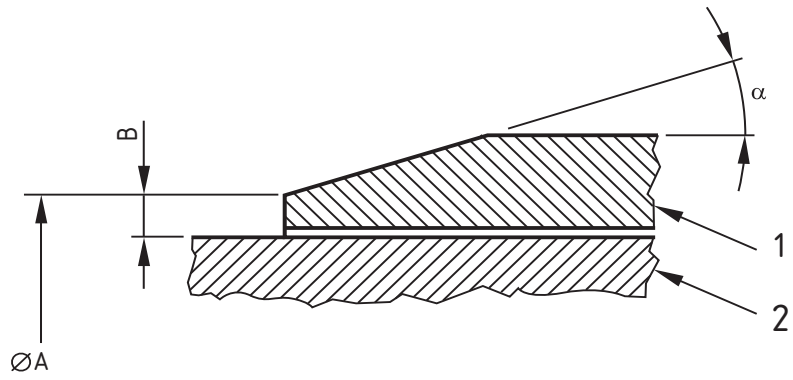
NOTE For larger micrometers, particularly above 300 mm or 12 in, the diameter of the thimble and barrel should be substantially larger than the minimum specified.

6.2 The angle of the bevel (Figure 2, angle α,) shall be no greater than 20°.

NOTE It is recommended that, for ease of reading, the angle of the bevel should be 15°.

6.3 The distance from the barrel to the reading end of the graduation on the thimble (Figure 2, dimension B) shall not exceed 0.015 in or 0.381 mm.

Figure 2 **Measurement of distance from barrel to reading end of graduation**



Key
1 Thimble
2 Barrel

6.4 All graduation lines shall be clearly cut. Those on the thimble and the fiducial line, and vernier lines when applicable, on the barrel, shall have a width of 0.152 mm to 0.203 mm or 0.006 in to 0.008 in.

NOTE 1 Whilst the thickness of the remaining graduations on the barrel is not of prime importance, it is recommended that these graduations do not vary in thickness from the others by an obvious amount.

NOTE 2 It is recommended that, for ease of reading, the surfaces of the thimble and barrel should have a dull finish and that the graduation lines should be blackened.

6.5 The thimble and barrel shall be graduated as follows.

a) For metric reading micrometers, the thimble shall be graduated with 50 divisions, each representing 0.01 mm, and numbered at 0, 5, 10, 15 etc., up to 45.

The barrel shall bear a longitudinal fiducial line which is parallel to the axis of the spindle and graduated in 0.5 mm intervals. The first, and every tenth graduation, shall be numbered 0, 5, 10, 15, 20 and 25 respectively. The graduation lines indicating full millimetres shall be distinguished from the graduation lines indicating half millimetres either by length or position.

NOTE Verniers should not be incorporated in metric-reading micrometers.

b) For inch reading micrometers, the thimble shall be graduated with 25 divisions, each representing 0.001 in, and numbered at 0, 5, 10, 15 and 20.

If desired, each of these main 0.001 in divisions may be divided into two sub-divisions.

The barrel shall bear a longitudinal fiducial line which is parallel to the axis of the spindle and graduated in ¼₀ in intervals. Every ¹⁄₁₀ in graduation shall be numbered, and every ¹⁄₁₀ in and ¹⁄₂₀ in graduation marginally extended either above or below the fiducial line.

In vernier micrometers, the vernier lines shall be engraved on the upper part of the barrel (see Figure 1), the ten vernier spaces being equal to nine divisions on the thimble. The graduations shall be numbered, 0, 1, 2 …. 9, and 0, and shall read in the direction shown in Figure 1.

When the main 0.001 in divisions on the thimble are sub-divided into two, it is permissible for the vernier to have five spaces equal to 4½ main divisions on the thimble.

NOTE Verniers should not be incorporated in micrometers with a capacity greater than 4 in, nor in micrometers of the adjustable type as described in the Scope, item b).

7 Adjustment

Each micrometer shall be provided with means for adjusting the zero setting (e.g. a spanner or key), and for compensating for wear between the screw and nut such that, after resetting, the parts are secured and the original accuracy of the instrument is not impaired.

8 Measuring faces

8.1 For 0-13 mm and 0-½ in micrometers, the measuring faces shall be no less than 4.5 mm or 0.177 in in diameter. For other micrometers, the measuring faces shall be no less than 6 mm or 0.236 in in diameter.

8.2 In every micrometer, the two measuring faces shall be equal in diameter to within 0.025 mm or 0.001 in.

8.3 The faces shall be finished by lapping, and, for all positions of rotation of the spindle, shall be flat and parallel within the parameters

specified in Table 3, Columns 2 and 3, or Table 4, Columns 2 and 3 (see Annex A for recommended tests).

8.4 Any sharp edges of the measuring faces on the spindle and anvil shall be removed.

9 Accuracy

9.1 At an ambient temperature of 20 °C, each micrometer shall conform to the limits of error specified in Table 3 to Table 6 (as applicable).

9.2 The zero reading (except in the case of micrometers with sliding anvils) shall be correct within the tolerance specified in Table 3, Column 4, or Table 4, Column 4. For vernier micrometers, this applies to both the fiducial line and vernier simultaneously.

9.3 The maximum range of error in the calibration of the micrometer screw shall not exceed the tolerance specified in Column 5 of the applicable table.

9.4 The alignment of the spindle and the anvil shall be such that the prolongation of the axis of the spindle shall not deviate from the centre of the anvil face by more than the amounts specified in Column 6 of the applicable table.

9.5 Where a ratchet or friction drive is fitted, this shall be used in taking the zero reading. The reading taken shall be that obtained as soon as the ratchet or fiction drive has slipped, after the spindle has been slowly advanced to the anvil.

NOTE 1 Rapid rotation of the ratchet or friction drive will give false readings.

NOTE 2 The range of error in the calibration of the micrometer screw is independent of the zero setting; it represents the maximum difference between the ordinates of the curve of error in the readings obtained on calibrating the screw at a number of positions along its traverse. These positions are chosen so as to check not only the progressive errors in the screw but also the accuracy of the graduations round the thimble, the fiducial line, and the vernier on the barrel if present.

Table 3 **Maximum permissible errors for micrometers with fixed anvils – metric readings**

1	2	3	4	5	6
Measuring range of micrometer	**Measuring faces**		**Zero reading**	**Range of error of traverse of micrometer screw**	**Error in alignment**
	Flatness	**Parallelism**			
mm	mm	mm	mm	mm	mm
0-13 0-25	0.001	0.003	± 0.001	0.003	0.05
25-50	0.001	0.003	± 0.001	0.003	0.08
50-75	0.001	0.005	± 0.003	0.003	0.13
75-100	0.001	0.005	± 0.003	0.003	0.15
100-125	0.001	0.005	± 0.003	0.003	0.20
125-150	0.001	0.005	± 0.003	0.003	0.23
150-175	0.001	0.005	± 0.003	0.003	0.25
175-200 200-225	0.001	0.005	± 0.003	0.003	0.30
225-250 250-275 275-300	0.003	0.008	± 0.005	0.003	0.40
300-325 325-350 350-375	0.003	0.013	± 0.008	0.005	0.45
375-400 400-425 425-450	0.003	0.015	± 0.008	0.005	0.50
450-475 475-500 500-525	0.003	0.018	± 0.010	0.005	0.65
525-550 550-575 575-600	0.003	0.020	± 0.010	0.005	0.75

*NOTE See **9.5**, Note 1 and Note 2.*

Table 4 **Maximum permissible errors for micrometers with fixed anvils – inch readings**

1	2	3	4	5	6
Measuring range of micrometer	**Measuring faces**		**Zero reading**	**Range of error of traverse of micrometer screw**	**Error in alignment**
	Flatness	**Parallelism**			
in	in	in	in	in	in
0-½ 0-1	0.000 05	0.000 1	± 0.000 05	0.000 1	0.002
1-2	0.000 05	0.000 1	± 0.000 05	0.000 1	0.003
2-3	0.000 05	0.000 2	± 0.000 1	0.000 1	0.005
3-4	0·000 05	0.000 2	± 0.000 1	0.000 1	0.006
4-5	0.000 05	0.000 2	± 0.000 1	0.000 1	0.008
5-6	0.000 05	0.000 2	± 0.000 1	0.000 1	0.009
6-7	0.000 05	0.000 2	± 0.000 1	0.000 1	0.010
7-8 8-9	0.000 05	0.0002	± 0.000 1	0.000 1	0.012
9-10 10-11 11-12	0.000 1	0.000 3	± 0.000 2	0.000 1	0.015
12-13 13-14 14-15	0.000 1	0.000 5	± 0.000 3	0.000 2	0.018
15-16 16-17 17-18	0.000 1	0.000 6	± 0.000 3	0.000 2	0.020
18-19 19-20 20-21	0.000 1	0.000 7	± 0.000 4	0.000 2	0.025
21-22 22-23 23-24	0.000 1	0.000 8	± 0.000 4	0.000 2	0.030

*NOTE See **9.5**, Note 1 and Note 2.*

Table 5 **Maximum permissible errors for micrometers with interchangeable or sliding anvils – metric readings**

1	2	3	4	5	6
Measuring range of micrometer	**Measuring faces**		**Zero reading**	**Range of error of traverse of micrometer screw**	**Error in alignment**
	Flatness	**Parallelism**			
mm	mm	mm	mm	mm	mm
0-50	0.001	0.008	± 0.003	0.003	0.13
0-100	0.001	0.010	± 0.003	0.003	0.20
100-200	0.001	0.013	± 0.003	0.003	0.40
200-300	0.003	0.015	± 0.005	0.003	0.50
300-400	0.003	0.020	± 0.008	0.005	0.60
400-500	0.003	0.025	± 0.010	0.005	0.75
500-600	0.003	0.030	± 0.013	0.005	1.00

Table 6 **Maximum permissible errors for micrometers with interchangeable or sliding anvils – inch readings**

1	2	3	4	5	6
Measuring range of micrometer	**Measuring faces**		**Zero reading**	**Range of error of traverse of micrometer screw**	**Error in alignment**
	Flatness	**Parallelism**			
in	in	in	in	in	in
0-2	0.000 05	0.000 3	± 0.000 1	0.000 1	0.005
0-4	0.000 05	0.000 4	± 0.000 1	0.000 1	0.008
4-8	0.000 05	0.000 5	± 0.000 1	0.000 1	0.016
8-12	0.000 1	0.000 6	± 0.000 2	0.000 1	0.020
12-16	0.000 1	0.000 8	± 0.000 3	0.000 2	0.025
16-20	0.000 1	0.001 0	± 0.000 4	0.000 2	0.030
20-24	0.000 1	0.001 2	± 0.000 5	0.000 2	0.040

10 Zero setting

A suitable gauge for setting the zero reading shall be provided with each micrometer capable of measuring a length of more than 25 mm or 1 in.

11 Case

Each micrometer shall be supplied in a suitable protective case or box.

12 Packing

As a protection against climatic conditions each micrometer shall be coated with a suitable thin, non-corrosive, light oil and be securely wrapped.

13 Marking

Each micrometer shall be legibly and permanently marked, in characters not less than 0.635 mm or 0.025 in high, with the manufacturer's name or trade mark.

14 Material of setting gauges

The setting gauges shall be of steel, with hardened measuring faces.

15 General design of setting gauges

For micrometers with a measuring range of 25-50 mm or 1-2 in, the setting gauge shall be a disk of 25 mm or 1 in diameter, respectively.

For larger sizes, the gauges shall be either flat-ended or spherical-ended rods. The minimum diameter of the rod shall be in accordance with Table 7.

Table 7 **Rod diameters**

Length of rod	Minimum diameter
	in
Up to and inc. 300 mm or 12 in	1/4
Above 450 mm or 13 in up to and inc. 18 in	5/16
Above 575 mm or 19 in up to and inc. 23 in	3/8

For spherical-ended rods, the centre of curvature of the faces shall be on the axis of the rod, and the radius of curvature shall be equal to, or marginally less than, half the length of the rod.

Rod gauges above 150 mm or 6 in in length shall be fitted with a heat insulating sleeve or sleeves.

NOTE The fitting of heat insulating sleeves is optional on shorter rod gauges.

16 Accuracy of setting gauges

At an ambient temperature of 20 °C, the setting gauges shall conform to the following limits of error.

a) Disks shall be uniform in diameter to within 0.001 mm or 0.000 05 in. The mean diameter shall be within ± 0.001 mm or ± 0.000 05 in of nominal size.

b) For rod gauges, the error in length shall not exceed the appropriate amount specified in Table 8, Column 2, and Table 9, Column 2.

The error in parallelism of the faces of flat ended rods shall not exceed the appropriate amount specified in Table 8, Column 3, and Table 9, Column 3.

Table 8 **Maximum permissible errors in setting rod gauges – metric readings**

1	2	3
Size of setting gauge	**Maximum permissible errors**	
	in length	**in parallelism of flat end faces**
mm	mm	mm
50, 75, 100, 125	± 0.002	0.001
150, 175, 200	± 0.003	0.001
225, 250, 275	± 0.004	0.001
300, 325, 350, 375, 400, 425	± 0.005	0.003
450, 475, 500, 525, 550, 575	± 0.006	0.005

Table 9 **Maximum permissible errors in setting rod gauges – inch readings**

1	2	3
Size of setting gauge	**Maximum permissible errors**	
	in length	**in parallelism of flat end faces**
in	in	in
2, 3, 4, 5	± 0.000 10	0.000 05
6, 7, 8	± 0.000 10	0.000 05
9, 10, 11	± 0.000 15	0.000 05
12, 13, 14, 15, 16, 17	± 0.000 20	0.000 1
18, 19, 20, 21, 22, 23	± 0.000 25	0.000 2

17 Packing of setting gauges

As a protection against climatic conditions, each setting gauge shall be coated with a suitable non-corrosive preparation (e.g. hard-drying lanolin).

18 Marking of setting gauges

Each setting gauge shall be legibly and permanently marked with:

a) the manufacturer's name or trade mark;

b) the nominal size.

Annex A (informative) Recommended methods of testing micrometers

A.1 Principle

The most important factors in the testing of micrometers are the accuracy of the measuring faces in flatness and parallelism, and the accuracy of the micrometer screw.

A.2 Test for measuring faces – flatness

A.2.1 Clean the measuring face thoroughly and bring a glass optical flat gently into contact with it.

A.2.2 When the contact is stabilized, either a general colouration or a few circular interference bands will be seen on the surface. The shape and number of these bands will indicate the degree of flatness on the measuring face. Count the number of coloured interference bands on the surface of the measuring face. As an example, the tolerance on flatness of 0.000 05 in specified in Table 4 for micrometers up to 9 in is met if not more than five interference bands of the same colour are visible on either of the measuring faces.

*NOTE The bands are more crisply defined if a mercury vapour light, **ideally with a green filter,** is used for illumination.*

A.2.3 Repeat **A.2.1** and **A.2.2** with each measuring face.

A.3 Tests for measuring faces – parallelism – 0-1 in micrometers

A.3.1 Apparatus

Four optical flats, the thicknesses of which differ in succession by approximately a quarter of 0.025 in, the opposite faces of which are accurately parallel and flat.

A.3.2 Procedure

A.3.2.1 Place an optical flat between the measuring faces.

A.3.2.2 When the interference bands have formed on the two measuring faces, carefully move the glass plate between the measuring faces so the number of bands visible on one face is reduced to a minimum. Count the interference bands on the opposite face.

A.3.2.3 Repeat for the other face.

A.3.2.4 Repeat for each optical flat so that the test is carried out at four positions during a complete rotation of the micrometer face.

NOTE The object of making the test with optical flats of different thicknesses is to check the parallelism of the faces for different angular positions of the face on the micrometer spindle.

A.3.2.5 There should be not more than ten interference bands of the same colour on any measuring face.

A.4 Test for measuring faces – parallelism – micrometers up to 4 in

If desired, the same method can be used for testing the parallelism of the faces of larger micrometers up to about 4 in. Two of the optical flats are then wrung on to the ends of a combination of gauge blocks and the whole combination thus formed is used as a parallel-ended test piece between the measuring faces. The test can be carried out in four positions as before by changing the length of the gauge block combination between the glass endpieces by 0.006 in or 0.007 in in succession.

A.5 Test for measuring faces – parallelism – micrometers over 4 in

Make test pieces of suitable length for each size of micrometer by soldering ⅛ in or 3⁄16 in steel balls onto the ends of a length of ¼ in diameter steel rod.

Insert the test pieces between the measuring faces of the micrometer at a number of positions round their periphery.

Note any variation found to occur in the micrometer readings.

NOTE Instead of making a separate test piece for each size of micrometer, a single one capable of adjustment for length may be used.

A.6 Test for calibration of micrometer screw – 0-1 in

A.6.1 Apparatus

A.6.1.1 For inch micrometer testing, gauge blocks of the following sizes: 0.105, 0.210, 0.315, 0.420, 0.500, 0.605, 0.710, 0.815, 0.920, and 1.000 in.

A.6.1.2 For metric micrometer testing, gauge blocks of the following sizes: 2.5, 5.1, 7.7, 10.3, 12.9, 15.0, 17.6, 20.2, 22.8, and 25.0 mm.

NOTE 1 Both these series give readings which work round the thimble twice over and so provide a double check on any periodic error which might be present.

NOTE 2 Series with fewer gauges could be used, if desired, as follows:

- *0.130, 0.250, 0.385, 0.500, 0.615, 0.750, 0.870, and 1.000 in;*
- *3.1, 6.5, 9 .7, 12.5, 15.8, 19.0, 21.9, and 25.0 mm.*

*These would not, however, give as close a test of progressive and periodic errors as those recommended in **A.6.1.1** and **A.6.1.2**.*

A.6.1.3 For testing vernier graduations of an inch micrometer, gauge blocks of the following sizes: 0.100 0, 0.100 2, 0.100 4, 0.100 6, 0.100 8, and 0.101 0 in.

A.6.2 Procedure

Take readings using the applicable series of gauge blocks at complete turns of its thimble and at intermediate positions to check the accuracy of the graduations round the thimble.

NOTE In order to facilitate the accurate reading of the micrometer during a calibration, the thimble may be viewed under a microscope of low power magnification.

A.7 Test for calibration of micrometer screw – above 1 in

A.7.1 Test using gauge blocks

Check for errors with gauge blocks of the sizes given in **A.6.1** by clamping the micrometer to a surface plate and fixing a temporary anvil, with a rounded face, close to the face of its spindle.

A.7.2 Test using an indicator

Using an indicator with a sensitivity of at least 0.000 05 in as a temporary anvil, read the errors in the traverse of the micrometer on the scale of the indicator instead of on the micrometer itself.

Set the micrometer accurately "line-to-line" at the exact readings corresponding to the sizes of the gauge blocks inserted between the micrometer face and the contact point of the indicator.

NOTE If it is not possible to fix an indicator directly opposite the face of the micrometer spindle of the smaller sizes of micrometers, such as 2-3 in or 3-4 in, a reading may be obtained by inserting a simple form of lever between the face and the contact point of the indicator, which is secured in a convenient position.

Annex B (informative)

Information to be supplied by the purchaser with his enquiry

The following items are for the guidance of purchasers in framing an enquiry, so that their requirements can be fully understood.

a) Range of micrometer, and whether metric or inch reading.

b) Any particular requirements as to type and finish of frame (see Clause **3**).

c) Whether a vernier is required.

NOTE It is recommended that verniers are not incorporated in micrometers with a capacity greater than 4 in, micrometers of the adjustable type, or in metric micrometers of any capacity.

d) Whether a spindle clamp is required (see Clause **5**).

e) Whether a friction or ratchet drive is required, and whether a special pressure is required (see Clause **5**).

Bibliography

Standards publications

ISO 3611, *Geometrical product specifications (GPS) — Dimensional measuring instruments — Micrometers for external measurements; Design and metrological characteristics* (in preparation)

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