

Specification for

Precision vernier callipers

Cooperating organizations

The Mechanical Engineering Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

Associated Offices Technical Committee	Department of Transport
Association of Consulting Engineers	Electricity Supply Industry in England and Wales
Association of Hydraulic Equipment Manufacturers	Energy Industries Association
Association of Mining Electrical and Mechanical Engineers	Engineering Equipment Users' Association
British Compressed Air Society	Federation of Manufacturers of Construction Equipment and Cranes
British Electrical and Allied Manufacturers' Association (BEAMA)	Health and Safety Executive
British Gas Corporation	Institution of Gas Engineers
British Gear Manufacturers' Association	Institution of Mechanical Engineers
British Internal Combustion Engine Manufacturers' Association	Institution of Plant Engineers
British Pump Manufacturers' Association	*Institution of Production Engineers
British Steel Corporation	Lloyd's Register of Shipping
British Steel Industry	London Transport Executive
Chartered Institution of Building Services	Machine Tool Industry Research Association
Crown Agents for Oversea Governments and Administrations	*Ministry of Defence
Department of Industry (Mechanical Engineering)	National Coal Board
Department of Industry (National Engineering Laboratory)	Oil Companies Materials Association
Department of the Environment (PSA)	Process Plant Association
Department of Trade (Marine Division)	Society of Motor Manufacturers and Traders Limited
	Telecommunication Engineering and Manufacturing Association (TEMA)
	Water-tube Boilermakers' Association

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

British Industrial Fasteners Federation	Gauge and Tool Makers' Association
Department of Industry (British Calibration Service)	Screw Thread Tool Manufacturers' Association
Department of Industry (National Physical Laboratory)	Coopted member

This British Standard, having been prepared under the direction of the Mechanical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 July 1982

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Foreword

This revision of this British Standard has been prepared under the direction of the Mechanical Engineering Standards Committee. It was first issued in 1940 and was later revised in 1950 when it specified imperial and metric reading instruments. This latest revision supersedes the 1950 edition which is now withdrawn.

Because industry still has a need for imperial callipers, this latest revision specifies requirements for both metric and imperial reading instruments. It also includes requirements for one design of vernier scale expressed in either (a) millimetres or centimetres, or (b) inches.

In recent years ISO/TC 3 has agreed standards for precision vernier callipers and this latest revision is aligned with those developments.

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Summary of pages

This document comprises a front cover, an inside front cover, page i and ii pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

The principal features of callipers are shown in Figure 1 but details of design may vary between manufacturers. The accuracy of performance of a calliper is based upon the quality and precision of the various features, e.g. the accuracy of the dividing of the scales, the quality of the graduation marks, the straightness of the guiding edge and the flatness of the side. These are all features which the manufacturer controls in order that measurements made with the instrument may be reliable within the tolerances given in clause 6.

1 Scope

This British Standard specifies requirements for the construction, for the accuracy at the reference temperature of 20 °C and for the protection of metric and imperial precision vernier callipers with external and internal contact faces. The metric callipers measure lengths up to a maximum of 1 000 mm using a main scale and vernier scale graduated to read to 0.02 mm. The imperial callipers measure lengths up to a maximum of 48 in using a main scale and vernier scale graduated to read to 0.001 in.

NOTE Attention is drawn to the fact that the metric dimensions are not necessarily direct conversions of the imperial dimensions. For instance, the vernier division of 0.02 mm marked on the metric calliper corresponds to a 0.001 in vernier division on the imperial calliper, whereas the actual conversion is 0.001 in = 0.0254 mm.

Methods of testing and information on the use of callipers are given in appendices B and C.

2 References

The titles of the standards publications referred to in this standard are listed on the inside back cover.

3 Nomenclature and definitions

For the purposes of this standard, the nomenclature shown in Figure 1, together with the following definitions, apply.

3.1 deviation of reading

the difference between the vernier scale reading and the length separating the external measuring faces

3.2 measuring range

the range of lengths that the external jaws may be used to measure without the vernier scale extending beyond the main scale

4 Construction

4.1 Material. The slider and beam shall be of carbon steel or stainless steel. The coefficient of thermal expansion within the temperature range of 10 °C to 30 °C shall be within $(11.5 \pm 1.0) \times 10^{-6}/^{\circ}\text{C}$. The measuring faces shall be hardened to not less than 700 HV for carbon steel and not less than 550 HV for stainless steel. Finished callipers shall be free from internal stresses.

4.2 Measuring ranges. The measuring ranges shall be as shown in Table 1.

Table 1 — Measuring ranges

Metric	Imperial
mm	in
0 to 150	0 to 6
0 to 300	0 to 12
0 to 600	0 to 18
0 to 1 000	0 to 24
	0 to 36
	0 to 48

4.3 Beam. The beam shall be long enough to prevent overhang of the sliding jaw assembly at the limit of the nominal measuring range. A recommended minimum section for the beam for each measuring range is shown in appendix A.

4.4 Jaws

4.4.1 Projections from beam (*J*). The projections of the jaws from the edge of the beam shall be as shown in Table 2.

The projections *J* of the two jaws shall be equal to within 0.03 mm or 0.001 in, as shall projections *J*₁. (See Figure 1.)