BRITISH STANDARD

BS 3123:1959

Specification for

Spring calipers and spring dividers

Confirmed
January 2011

Co-operating organizations

The Mechanical Engineering Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

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British Chemical Plant Manufacturers' Association
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British Electrical and Allied Manufacturers' Association
British Engineers' Association*
British Gear Manufacturers' Association
British Internal Combustion Engine Manufacturers' Association
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The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the Committee entrusted with the preparation of this standard:

Association of United Kingdom Plier Manufacturers
Edge Tool Manufacturers' Association
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National Federation of Building Trades Employers
National Union of Furniture Trades Operatives
Post Office
Saw Trades Association
Society of British Aircraft Constructors
Society of Motor Manufacturers and Traders
Co-opted manufacturers

This British Standard, having been approved by the Mechanical Engineering Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 17 June 1959

The following BSI references relate to the work on this standard:
Committee references MEE/120, MEE/120/8
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Amendments issued since publication

Amd. No.	Date	Comments

Contents

Foreword

This standard makes reference to the following British Standards:

BS 350, *Conversion factors and tables.*

BS 860, *Approximate comparison of hardness scales.*

BS 970, *Wrought steels.*

This British Standard has been prepared under the authority of the Mechanical Engineering Standards Committee and forms one of a series covering a wide range of hand tools.

Provision is made for three types of spring calipers and spring dividers, thus recognizing the preferences of individual craftsmen. The range of nominal sizes listed against each type covers those in common demand at the present time.

Components of spring calipers and dividers are rarely supplied as spares and therefore detailed consideration has only been given to those parts which directly affect the quality, functioning and life of the complete instrument. In compiling the specification care has been taken to ensure that the craftsman has a highly satisfactory tool at his command, recognizing at the same time that further design and production development of the instruments should not be unnecessarily restricted.

The dimensions, tolerances and other figures in the specification are given in the British system, which is to be regarded as the standard. The tools are, however, exported to all parts of the world and to assist those using the metric system a conversion table is included. The metric figures are approximate, and more accurate conversions should be based on the tables in BS 350.[1)]

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 4, 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.

[1)] BS 350, "*Conversion factors and tables*".

Section 1. General

1 Scope

This British Standard relates to the materials, manufacture and testing of the following types of spring calipers and spring dividers.

Type A: Instruments with rectangular section legs.

Type B: Instruments with squared section legs.

Type C: Instruments with round section legs.

2 Nomenclature

For the purpose of this British Standard the nomenclature given in Figure 1 applies.

Section 2. Manufacture

3 Material

The components of spring calipers and spring dividers shall be manufactured from the materials listed below:

a) Legs: From carbon spring steel conforming to BS 970[2] En 42 B.

b) Spring: From carbon spring steel conforming to BS 970[2] En 42 D.

c) Other components: From free cutting steel conforming to BS 970[2] En 1 B.

4 Heat treatment and hardness

a) *Legs*. The working ends of the divider legs shall be suitably heat-treated for a distance of $^3/_8$ in. from the extreme tips, to give a hardness that will enable the instrument to pass the test requirements of Clause **9** a) ii).

b) *Spring*. The spring shall be hardened and tempered to give a hardness reading within the range 470/520 HV (Diamond Pyramid Scale) using a 5 kg load.

The equivalent values on other hardness scales may be used in accordance with BS 860[3].

5 Dimensions and capacities

The dimensions and capacities of spring calipers and spring dividers shall be as follows:

a) *Nominal size*. The nominal size shall be the distance between the centre of the roller and the extreme working ends of the legs. (See Figure 1.)

The nominal sizes of Types A, B and C instruments shall be those given in Figure 2.

b) *Capacity*. The maximum capacity shall be not less than the nominal size of the instrument.

Internal spring calipers shall be capable of effective measurement in the following minimum sizes of bore:

Type A	3 in. nominal size	$^3/_8$ in.
	4 in. and 5 in. nominal sizes	$^7/_{16}$ in.
	6 in. nominal size	$^9/_{16}$ in.
	8 in. nominal size	$^{11}/_{16}$ in.
	10 in. nominal size	$^{13}/_{16}$ in.
	12 in. nominal size	$^{15}/_{16}$ in.
Types B and C (where applicable)		
	2 in. and 3 in. nominal sizes	$^{11}/_{32}$ in.
	4 in. 5 in. and 6 in. nominal sizes	$^3/_8$ in.

c) *Dimensions of leg sections*. The dimensions of the leg sections of spring calipers and spring dividers shall be in accordance with Figure 2.

6 Manufacture and assembly

Components of spring calipers and spring dividers shall be manufactured and assembled in accordance with the following requirements to ensure that smooth adjustment and efficient operation is achieved and maintained.

a) The instruments shall be adjusted by means of either a knurled solid nut or a knurled quick-action release nut operating on a finely threaded adjusting screw. The type of nut in relation to the class of instrument shall be as follows:

Type A. Either solid nut or quick-action release nut.

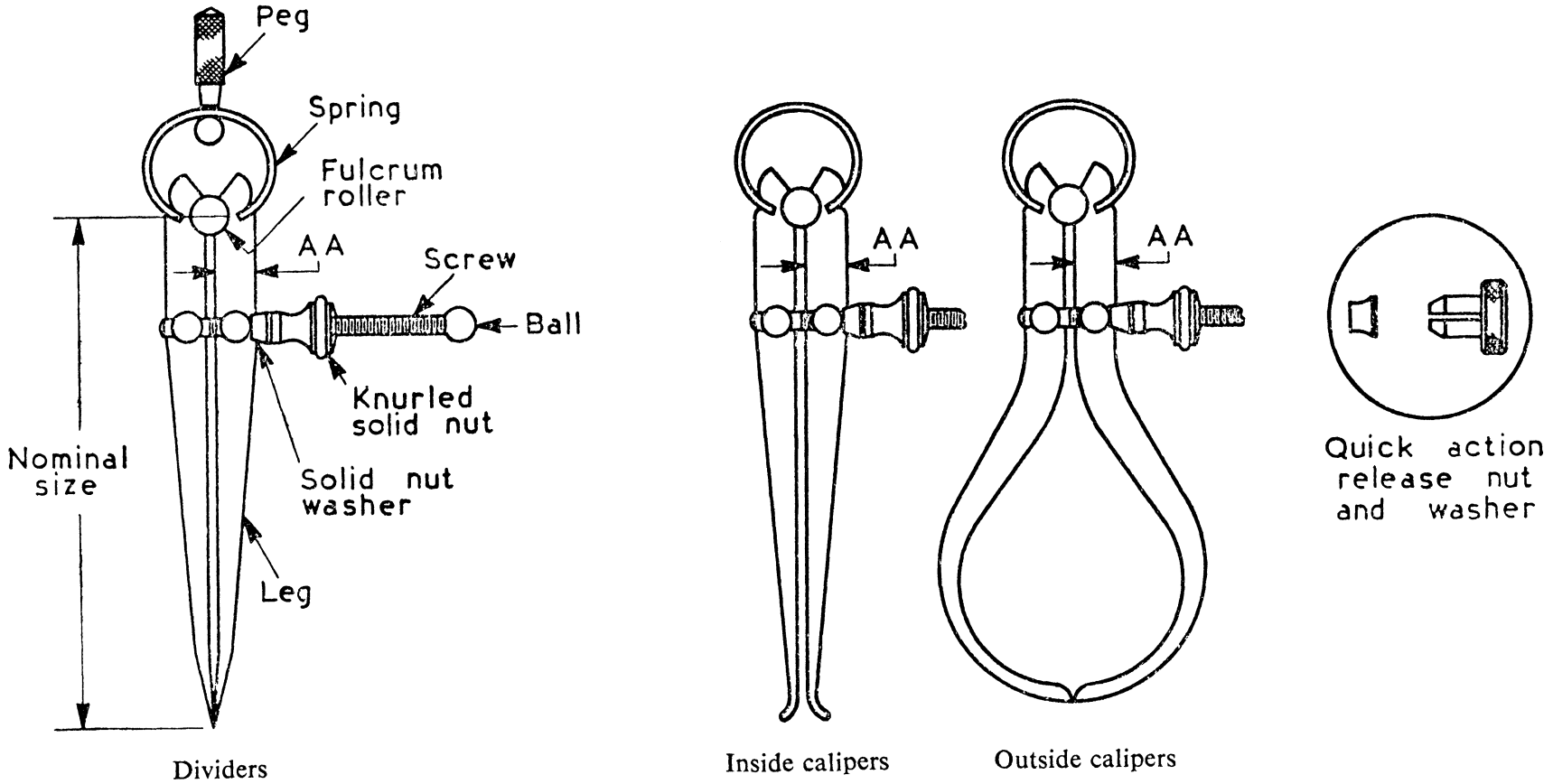
Type B. Quick-action release nut.

Type C. Solid nut.

b) The working ends of the legs of each instrument shall be identical in shape, with the contact points equally distant from the fulcrum. Each pair of calipers shall have the measuring ends of the legs so shaped that all sizes within its capacity may be readily transferred from measuring scales or gauges.

[2] BS 970, "*Wrought steels*".

[3] BS 860, *"Approximate comparison of hardness scales"*.



NOTE The illustrations are diagrammatic only.

Figure 1 — Nomenclature for spring calipers and spring dividers

c) In order to maintain alignment of the working ends, the tops of the legs shall be located in a flanged fulcrum roller and held in position by a spring. The spring, shall provide sufficient tension to hold the legs rigid at all points of adjustment.

d) Suitable means shall be employed to minimize friction between the adjusting nut and the leg of the instrument either by use of a separate washer under the nut, or by a washer-facing produced on the nut.

e) One end of the adjusting screw shall be securely hinged to a leg of the instrument, and a steel ball shall be positively fixed to the remaining free end of the screw for the purpose of retaining the adjusting nut.

f) The peg used for rotating the dividers between thumb and finger shall be knurled and located centrally in the spring. It shall be positively and securely fixed so that it will not turn independently of the remainder of the instrument.

7 Finish

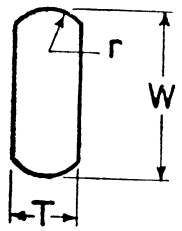
The component parts of spring calipers and spring dividers shall have a smooth bright finish, or, by agreement between purchaser and manufacturer, parts may be rust-proofed or coloured by chemical and/or thermal processes.

8 Marking

Each instrument shall be clearly and indelibly marked with the number of this British Standard, and with some means of positively identifying the source of manufacture, such as the manufacturer's name or trade mark.

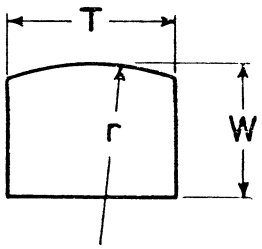
Form and dimensions of leg sections. Spring calipers and spring dividers

Type A: Rectangular section legs



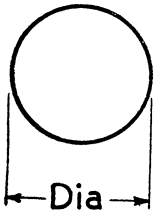
Nominal size of instrument	Dimensions of leg section at "A A" (Figure 1)		
	W	T	r
	in.	in.	in.
3 in.	1/4	7/64	5/64
4 in., 5 in.	5/16	1/8	5/64
6 in.	3/8	1/8	5/64
8 in., 10 in., 12 in.	7/16	5/32	1/8

Type B: Squared section legs



Nominal size of instrument	Dimensions of leg section at "A A" (Figure 1)		
	W	T	r
	in.	in.	in.
3 in.	7/32	1/4	13/32
4 in.	15/64	9/32	27/64
5 in.	1/4	5/16	7/16
6 in.	9/32	11/32	15/32

Type C: Round section legs



Nominal size of instrument	Dimension of leg section at "A A" (Figure 1)
	Diameter
	in.
2 in., 3 in.	0.200
4 in., 5 in.	0.250
6 in.	0.281

Figure 2

Section 3. Testing

Each instrument shall be capable of passing the following tests:

a) ***Functional tests***

i) *Spring calipers and spring dividers.* Each instrument shall work smoothly and retain its required size when adjusted to three test pieces or gauges, the sizes of which shall be relative to the approximate lower, middle and upper registers of the particular instrument range.

ii) *Spring dividers.* Each instrument shall be capable of scribing a clearly defined line across the face of a test block, the face of which shall be hardened within the range 620/660 HV (Diamond Pyramid Scale) using a 30 kg load. Following this test the working ends shall still be sharp and visual examination shall reveal no sign of damage or failure.

b) ***Joint and bend test.*** *Spring dividers.* With the divider legs opened to a distance of $^1/_4$ in., one leg shall be clamped securely in a vice at a point approximately $^1/_2$ in. from the fulcrum, so that the two legs are in a horizontal plane. A test load of 10 lb (4.54 kg) shall then be gradually applied by suspension from the free leg as close to the working end as is practicable. On removal of the load the joint of the instrument shall not have been displaced nor shall the legs show any sign of permanent set.

Table of metric equivalents

1	2	3	4	5	6	7	8
Inches	**Millimetres**	**Inches**	**Millimetres**	**Inches**	**Millimetres**	**Inches**	**Millimetres**
in.	mm	in.	mm	in.	mm	in.	mm
$^1/_{64}$	0.397	$^1/_4$	6.35	$^5/_8$	15.9	1	25.4
$^1/_{32}$	0.793	$^9/_{32}$	7.1	$^{21}/_{32}$	16.7	2	50.8
$^3/_{64}$	1.191	$^5/_{16}$	7.9	$^{11}/_{16}$	17.5	3	76.2
$^1/_{16}$	1.587	$^{11}/_{32}$	8.7	$^{23}/_{32}$	18.3	4	101.6
$^5/_{64}$	1.984	$^3/_8$	9.5	$^3/_4$	19.0	5	127.0
$^3/_{32}$	2.38	$^{13}/_{32}$	10.3	$^{25}/_{32}$	19.8	6	152.4
$^7/_{64}$	2.78	$^7/_{16}$	11.1	$^{13}/_{16}$	20.6	7	178
$^1/_8$	3.17	$^{15}/_{32}$	11.9	$^{27}/_{32}$	21.4	8	203
$^9/_{64}$	3.57	$^1/_2$	12.7	$^7/_8$	22.2	9	229
$^5/_{32}$	3.97	$^{17}/_{32}$	13.5	$^{29}/_{32}$	23.0	10	254
$^3/_{16}$	4.76	$^9/_{16}$	14.3	$^{15}/_{16}$	23.8	11	279
$^7/_{32}$	5.56	$^{19}/_{32}$	15.1	$^{31}/_{32}$	24.6	12	305

Conversion factor: 1 in. = 25.4 mm.
For more accurate conversions, see BS 350, "*Conversion factors and tables*".

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