BRITISH STANDARD

BS 3322:1981

Specification for

Carpenters' squares and bevels

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Contents

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Foreword

This British Standard has been prepared under the direction of the Mechanical Engineering Standards Committee.

This standard is a revision of the 1960 edition, which is withdrawn. It has been metricated and its object is to ensure that each tool capable of passing the tests given in clause **11** will give accurate service and satisfactory life under normal conditions of use.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, 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.

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1 Scope

This British Standard specifies the materials, nominal sizes, dimensions, quality, finish and testing of carpenters' squares and carpenters' sliding bevels. Recommended materials are shown in Appendix A and methods of testing accuracy are given in Appendix B.

2 References

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

3 Definitions

For the purposes of this British Standard the following definitions apply.

3.1
polished

the smooth finish produced by coating with polish or a lacquer applied by hand, by spraying or by dipping to seal the wood against moisture content change

3.2
error in parallelism

the difference between the maximum and minimum widths

NOTE General layout and terminology are shown in Figure 2 and Figure 3.

4 Materials

The components of carpenters' squares and bevels shall be manufactured from materials that are capable of complying with the requirements of clauses **5** and **11**.

NOTE Recommended materials are given in Appendix A.

5 Heat treatment and hardness

Blades shall be hardened and tempered, (see clause **4**), to have a hardness in the range 418 HV5 to 460 HV5, when tested in accordance with BS 427-1, using a machine which has been verified in accordance with BS 427-2.

6 Manufacture

6.1 General

6.1.1 All working faces and edges, together with components, shall be smoothly finished. When plates, tips and spacers are used they shall be smoothly finished, and flush with adjacent surfaces.

6.2 Squares

6.2.1 Facing plates on wooden stocks shall be positively secured to the stock.

6.2.2 No permanent set shall result on any square when tested in accordance with **11.1**.

6.2.3 The blade and stock of a square shall remain positively and permanently fixed when tested in accordance with **11.2**.

NOTE Blades may be graduated on the working edge(s).

6.2.4 The blade of a square shall be set back from the outer face of the stock by 0.4 mm to 4 mm, (see Figure 2).

6.3 Bevels

6.3.1 Tips and spacers on wooden stocks for bevels shall be positively secured to the stock.

6.3.2 No permanent set shall result on any bevel blade when tested in accordance with **11.1**.

6.3.3 Means shall be provided for positively locking the bevel blade in any position. The major diameter of the screw used for this purpose shall be not less than that for an M5 screw thread, (see BS 3643-1). The locking screw shall not protrude beyond the stock working face on at least one side. Locking of the blade shall be verified by carrying out the test in **11.3**, when, after removal of the mass, (see Figure 5), the blade shall have remained at 90° to the stock.

7 Accuracy

7.1 Straightness of working faces and working edges

7.1.1 *Squares.* The difference between the highest and lowest points of a working face shall not exceed an amount equal to 0.01 mm per 10 mm of stock length.

The difference between the highest and lowest points of a working edge shall not exceed 0.05 mm.

7.1.2 *Bevels.* The difference between the highest and lowest points of a stock working edge shall not exceed 0.25 mm.

The difference between the highest and lowest points of a blade working edge shall not exceed 0.125 mm.

NOTE An optional test for checking the straightness of working faces and working edges of carpenters' squares and bevels is given in **B.1**.

7.2 Parallelism of working faces and working edges

7.2.1 *Squares.* The maximum error in parallelism between the working and outer face shall not exceed 0.38 mm and between working edges shall not exceed 0.1 mm.

When the blade is graduated the tolerance on the nominal length shall be ± 1 mm at a temperature of 20 °C. The positional error of the whole scale relative to the selected face shall be ± 1 mm at a temperature of 20 °C.

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7.2.2 *Bevels.* The maximum error in parallelism between the stock working edges shall not exceed 0.38 mm and between the blade working edges shall not exceed 0.18 mm.

NOTE An optional test for checking the parallelism of working faces and working edges of carpenters' squares and bevels is given in **B.2**.

7.3 Squareness

7.3.1 The inner working edge of the blade of each square shall be square to the working face of the stock, subject to a maximum tolerance equal to 0.01 mm per 10 mm of blade length when measured at the tip of the blade.

NOTE An optional test for checking the squareness of carpenters' squares is given in **B.3**.

7.3.2 The maximum departure from lateral squareness (see Figure 1) of the blade of each square, with reference to the working face of the stock, shall not exceed an amount equal to 0.05 mm per 10 mm of blade length when measured at the tip of the blade.

8 Dimensions

The nominal dimensions of carpenters' squares and bevels shall be as shown in Figure 2 and Figure 3 and Table 1 and Table 2.

9 Finish

9.1 Blades. The blades shall be smoothly finished and shall be chemically blued or blacked or protected in a similar manner.

9.2 Stocks. The stocks shall be smoothly finished and if made of wood shall be polished.

9.3 Other metal parts. Other metal parts shall be given suitable anti-corrosion treatment.

10 Marking

Carpenters' squares and bevels shall be legibly and indelibly marked with the manufacturer's or supplier's name or trademark.

NOTE Tools may be additionally marked with the number of this British Standard, i.e. BS 3322[1)].

11 Performance tests

11.1 Permanent set. Secure the stock firmly and flex the tip of the blade through an angle of 15° in either lateral direction for a 115 mm square, and 30° in either lateral direction for all other sizes of squares and bevels. The blade of each bevel shall be fully extended and in line with the stock when conducting this test.

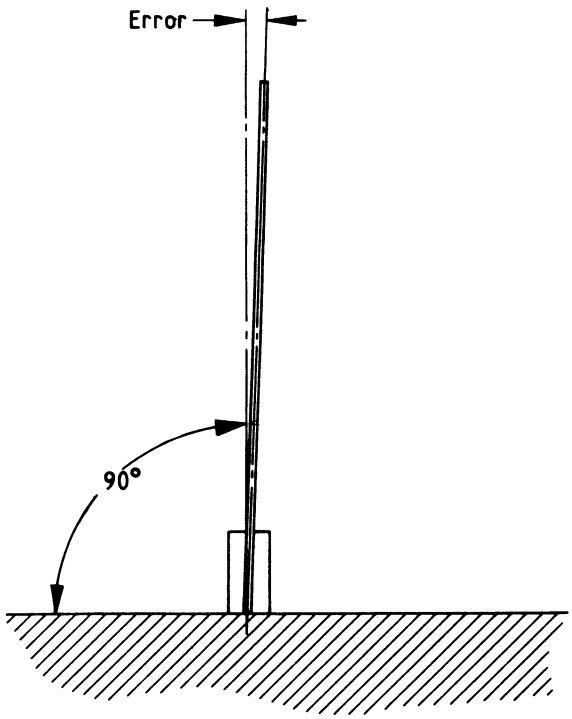

Figure 1 — Error in lateral squareness

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Table 1 — Nominal dimensions of carpenters' squares

A	*B*	*C*	*D*	*E*	*F*	*G*
mm	mm	mm	mm	mm	mm	mm
115	50	110	40	15	100	3
150	50	135	40	20	130	3
190	55	145	45	20	140	3
230	55	170	45	20	160	3
305	65	215	50	20	205	3

Table 2 — Nominal dimensions of carpenters' sliding bevels

A	*B*	*C*	*D*	*E*	*F*	*G*	$H_{(min)}$	$J_{(min)}$
mm	mm	mm	mm	mm	mm	mm	mm	mm
190	25	85	7	125	27	17	25	16
230	25	105	7	145	27	17	25	16
265	25	125	7	165	27	17	25	16
305	25	145	7	185	27	17	25	16

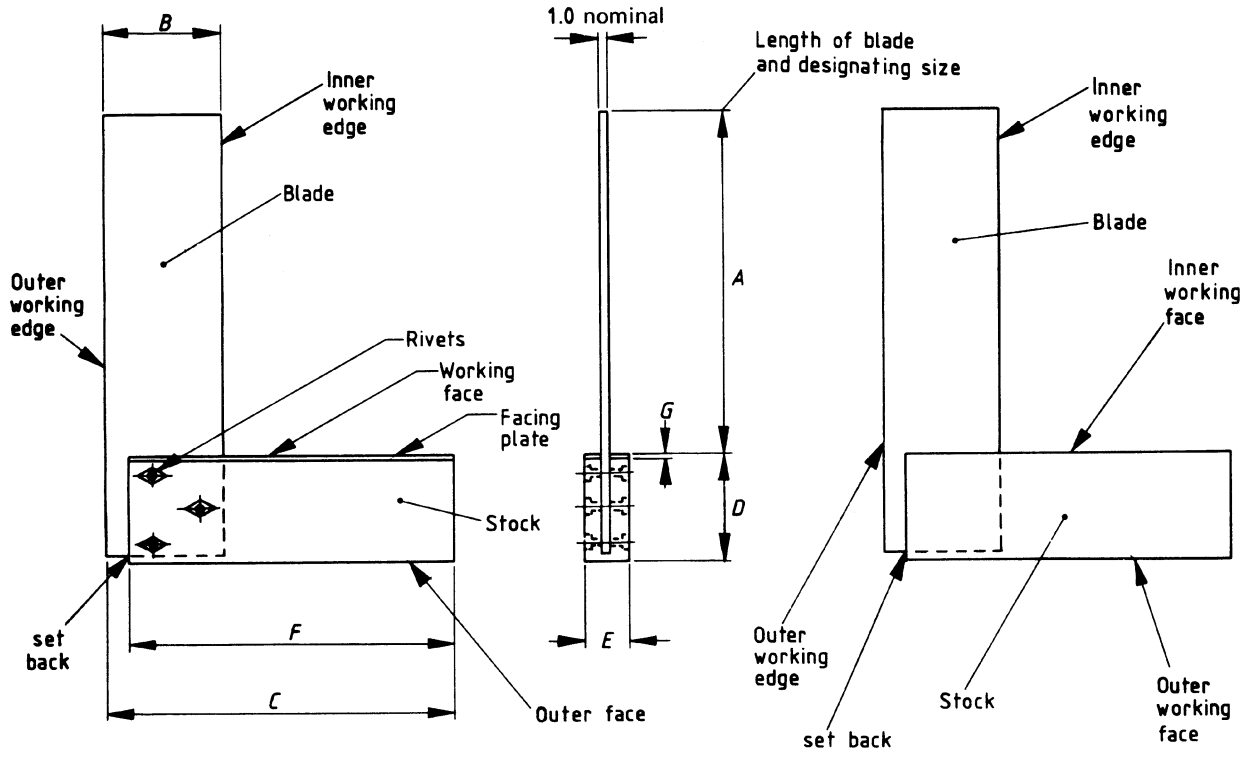

Figure 2 — Carpenters' squares

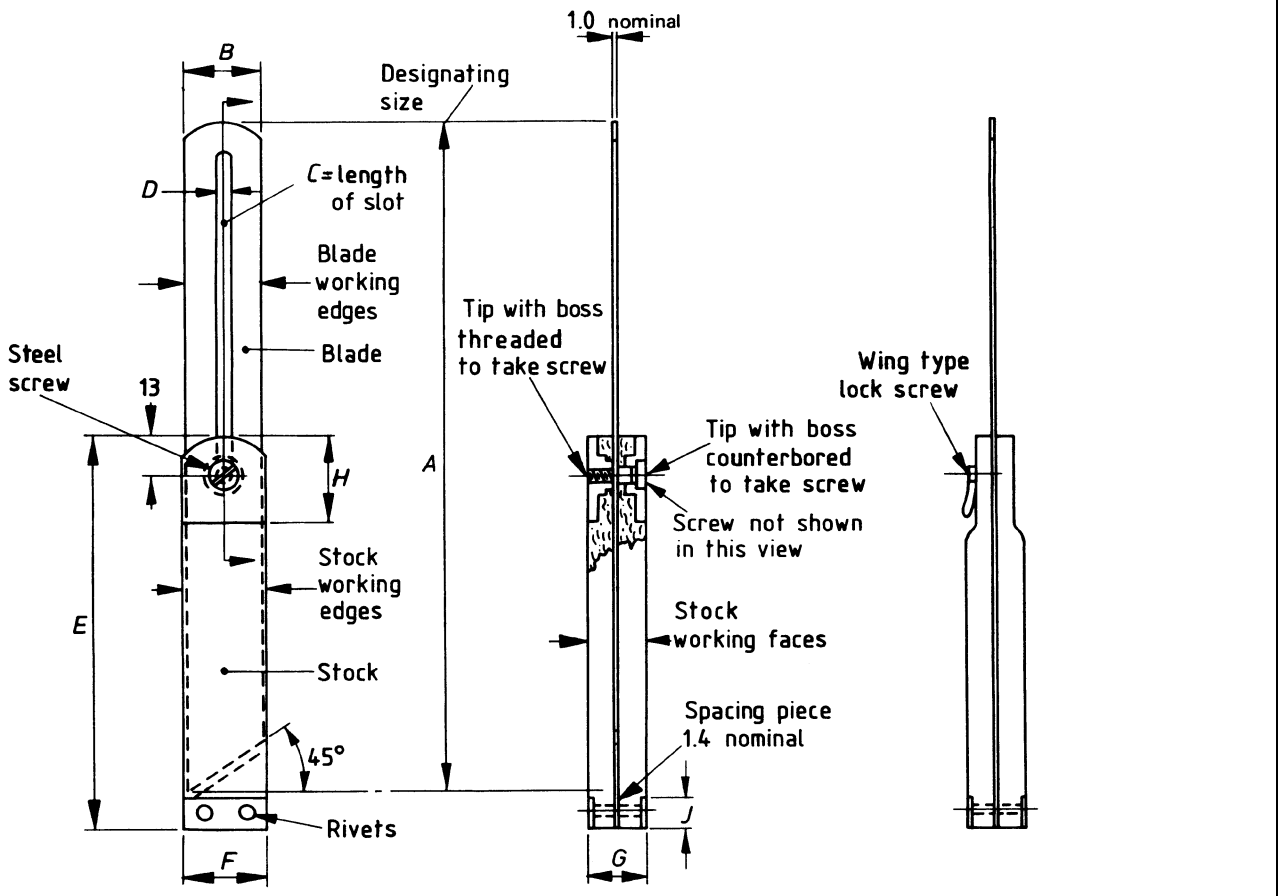

Figure 3 — Carpenters' sliding bevels

11.2 Blade security of carpenters' squares. Apply a metal mass of 4 kg onto the edge of the blade at a distance of 110 mm from the stock for squares of 115 mm blade length and 150 mm from the stock for all other sizes. The metal mass shall fall freely onto the edge of the blade from a height of 100 mm as shown in Figure 4.

11.3 Blade security of carpenters' bevels. Lock the blade in the fully extended position and at 90° to the stock. Secure the stock firmly and apply a mass of 1.5 kg to the edge of the blade to give a turning moment of 1.5 N m about the axis of the locking screw.

Table 3 — Position of load application for blade security of carpenters' squares

Blade length *A*	Distance from stock *X*
mm	m
115	110
150	150
190	
230	
305	

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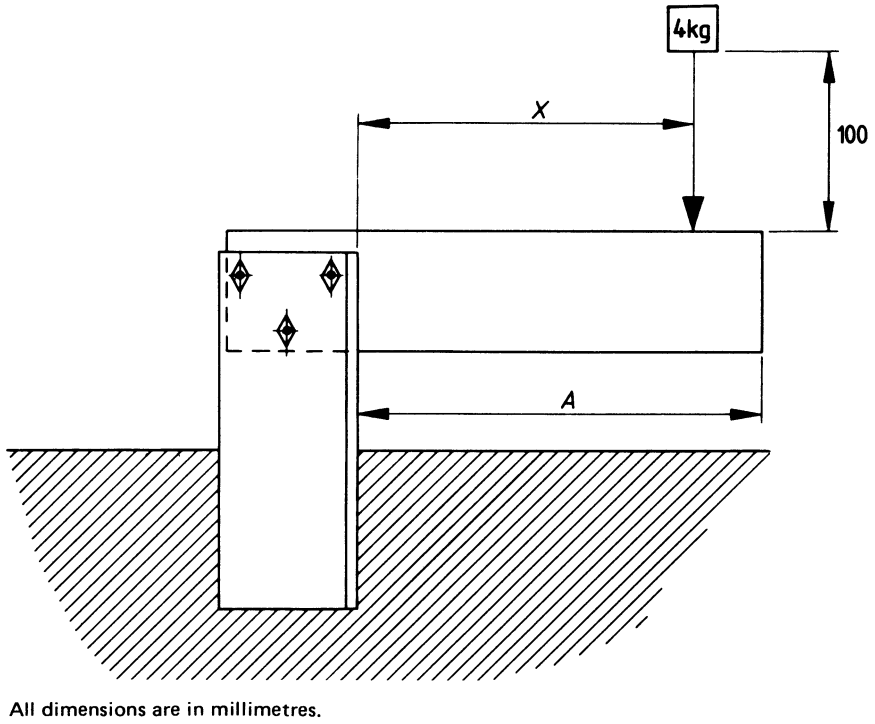
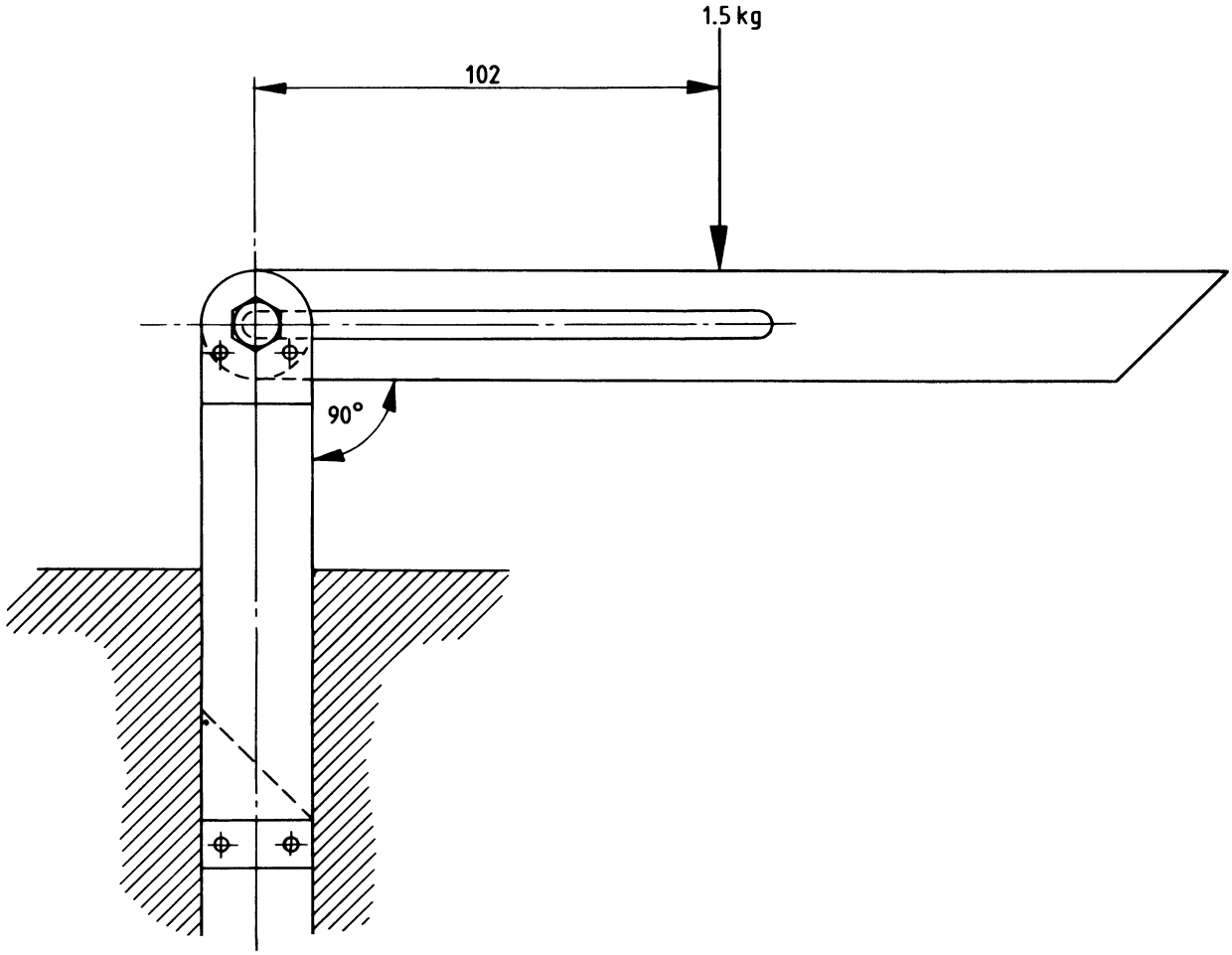


All dimensions are in millimetres.

NOTE See also Table 3.

Figure 4 — Test for blade security of carpenters' squares



Linear dimensions in millimetres.

Figure 5 — Test for blade security of carpenters' bevels

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Appendix A Recommended materials for carpenters' squares and bevels

A.1 Blades

Blades manufactured from steel capable of being heat treated to meet the hardness requirements in clause **5** and passing the tests specified in clause **11**.

A.2 Rivets

Rivets, either of steel complying with the requirements of BS 1052, or of brass complying with the requirements of BS 2874.

A.3 Facing plates, tips and spacing pieces

Facing plates, etc., made from brass complying with the requirements of BS 2870 when used in conjunction with wood stocks.

A.4 Stocks

Stocks made of wood, plastics or metal. When using wood, stocks made of a stable hardwood, such as beech or rosewood, straight-grained and free from sapwood or any visible defects, with a moisture content not exceeding 11 %. Wooden stocks should be supplied with a metal face plate. When using plastics, its stability should be equal to that of beech or rosewood.

A.5 Locking screws for bevels

Locking screws for bevels made from free cutting steel complying with the requirements of BS 970-1, e.g. 220M07, or of brass complying with the requirements of BS 2874.

Appendix B Methods of testing accuracy

B.1 A test for checking the straightness of working faces and working edges

The working faces and working edges of squares and bevels can be tested for accuracy by bedding them evenly on the working surface of a grade B surface plate, complying with the requirements of BS 817, and ensuring that a feeler gauge, complying with the requirements of BS 957-2, and with a thickness of the maximum appropriate tolerance specified in **7.1**, cannot pass between them and the surface plate.

B.2 A test for checking the parallelism of faces and of working edges

The parallelism of the working and outer face of a square and the working edges of squares and bevels, as specified in **7.2**, can be checked by direct measurement.

B.3 A test for checking squareness

The squareness of the inner working edge of the blade of a square to its working face, as specified in **7.3**, can be checked by comparing it to a grade A engineers' square as specified in BS 939.

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Publications referred to

BS 427, *Method for Vickers hardness test.*
BS 427-1, *Testing of metals.*
BS 427-2, *Verification of the testing machine.*
BS 817, *Surface plates and tables.*
BS 939, *Specification for engineers' squares (including cylindrical and block squares).*
BS 957, *Feeler guages.*
BS 957-2, *Metric units.*
BS 970, *Wrought steels in the form of blooms, billets, bars and forgings.*
BS 970-1, *Carbon and carbon manganese steels including free cutting steels.*
BS 1052, *Specification for mild steel wire for general engineering purposes.*
BS 2870, *Specification for rolled copper and copper alloys: sheet, strip and foil.*
BS 2874, *Copper and copper alloys. Rods and sections (other than forging stock).*
BS 3643, *ISO metric screw threads.*
BS 3643-1, *Thread data and standard thread series.*

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W4 4AL