# Woodworking saws for hand use —

## Part 1: Specification for hand saws

ICS 79.120.20

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee MTE/15, Hand tools, upon which the following bodies were represented:

British Telecommunications Plc
Co-opted Members
Consumer Policy Committee of BSI
Federation of British Hand Tool Manufacturers
Handle Manufacturers' Association
Home Office
Institute of Carpenters
Institute of Trading Standards Administration
London Borough of Barking and Dagenham
Ministry of Defence

This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on
15 January 1999



First published 1959
Second edition 1990
Third edition 1999

The following BSI references relate to the work on this standard:
Committee reference MTE/15
Draft for comment 97/719522 DC

**ISBN 0 580 29597 4**

## Amendments issued since publication

| Amd. No. | Date | Text affected |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

# Contents

# Foreword

This British Standard has been prepared by the BSI Committee MTE/15, Hand tools, and supersedes BS 3159-1:1990, which is withdrawn.

In this British Standard the specific requirements are given for four classes of hand saw, two for the use of craftsmen, one for first grade general duty, and one for general duty in the DIY environment.

Annex A is normative and annex B is informative.

A British Standard does not purport to include all 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 9 and a back cover.

## 1 Scope

This British Standard classifies types, and specifies certain dimensional aspects, of taper-ground and flat-ground hand saws for cutting timber. The hardness level and finish of the saw blades is specified and tests are included to verify the qualities of the complete saw.

Four classes of hand saw are specified, and in each class, saws from 450 mm to 660 mm in length are available.

This part of BS 3159 distinguishes between saws intended for ripping and those for cross cutting.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of BS 3159. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest editions of the publication referred to applies.

BS EN ISO 6507-1, *Metallic materials — Vickers hardness test — Test method.*

BS 2782-3 Methods 320A to 320F, *Tensile strength, elongation and elastic modulus.*

BS 2782-3 Method 350, *Determination of Izod impact strength.*

## 3 Terms and definitions

For the purposes of this part of BS 3159 the following terms and definitions apply.

**3.1**

**nominal size**

overall length of the toothed edge of the blade, including any rounding of the toe (see Figure 1)

**3.2**

**toe**

end of the blade farthest from the handle (see Figure 1)

**3.3**

**heel**

end of the blade nearest the handle (see Figure 1)

**3.4**

**skew back**

saw blade which has a concave edge opposite to the toothed edge (see Figure 1)

**3.5**

**straight back**

saw blade which has a straight edge opposite to the toothed edge (see Figure 1)

**3.6**

**breasted**

saw blade which has a convex toothed edge (see Figure 2)

**3.7**

**taper ground**

saw blade uniform in thickness along the entire length of the toothed edge and uniformly tapered in thickness from the toothed edge to the back

**3.8**

**flat ground**

saw blade which is ground so as to be the same thickness from the toothed edge to the back edge

**3.9**

**pitch**

distance between adjacent teeth measured from point to point (see Figure 3)

**3.10**

**full cross sharpening of the teeth**

sharpening of the rake and flank faces of each outwardly set tooth to a vanishing edge at an acute angle to the central axis of the saw (see Figure 4)

NOTE Gullet, rake and flank face/angles are shown in Figure 3.

**3.11**

**half cross sharpening of the teeth**

sharpening of the rake face of each outwardly set tooth to a vanishing edge at an acute angle to the central axis of the saw

**3.12**

**straight sharpening of the teeth**

sharpening of the cutting edge normal to (90°) the side face of the saw (see Figure 4)

**3.13**

**hardpoint**

tooth which has increased hardness at the tooth tip

NOTE This is achieved by, for example, induction or impulse hardening methods.

## 4 Classification

### 4.1 Classes of saw

Hand saws shall be classified as follows:

a) class 1, a first grade saw for the use of craftsmen;

b) class 2, a good quality saw for the use of craftsmen;

c) class 3, a first grade general duty saw;

d) class 4, a saw for general duty in the DIY environment.

NOTE The specific requirements for each of the four classes of saw are given in clause **7**.

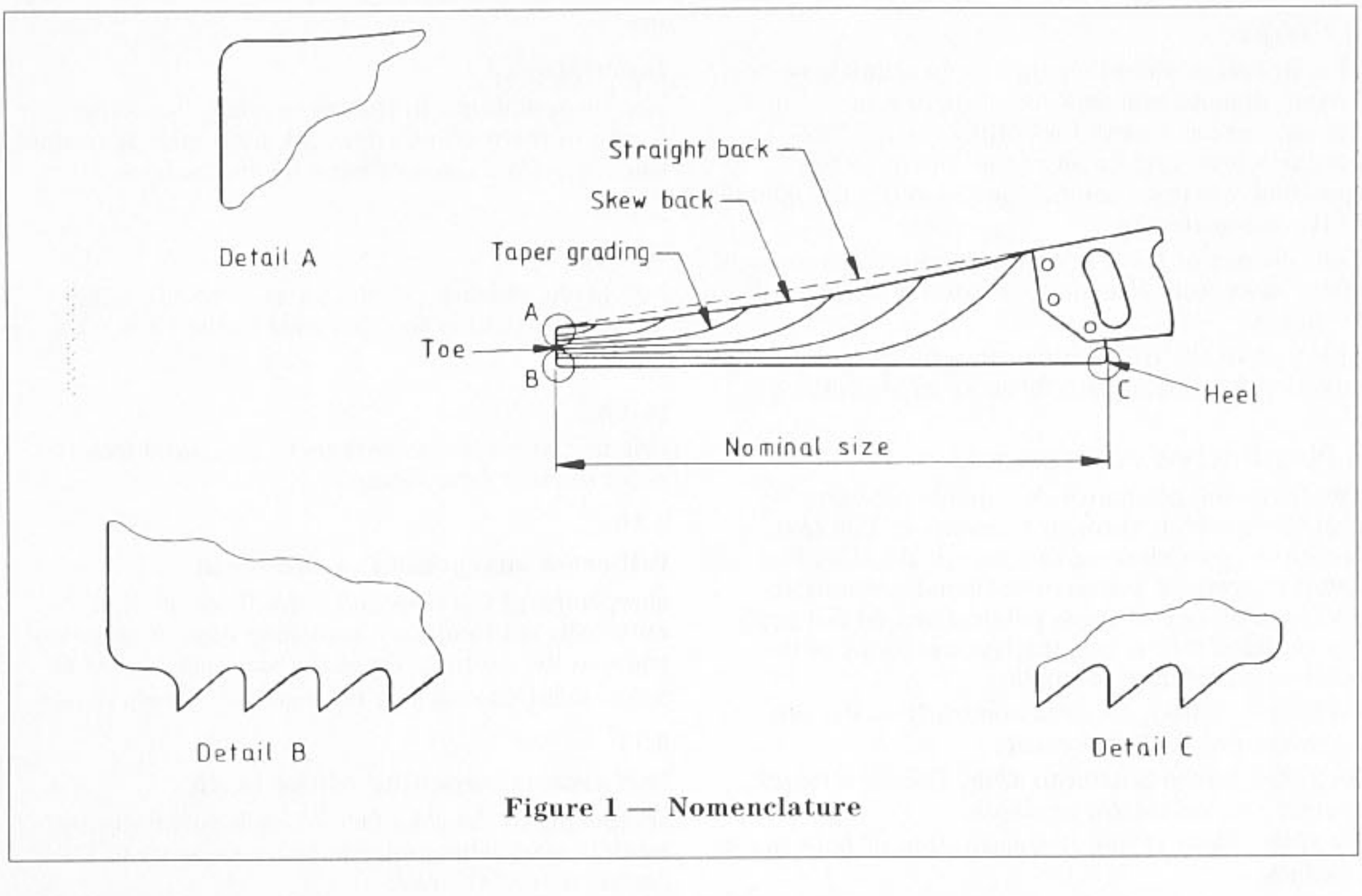



**Figure 1 — Nomenclature**

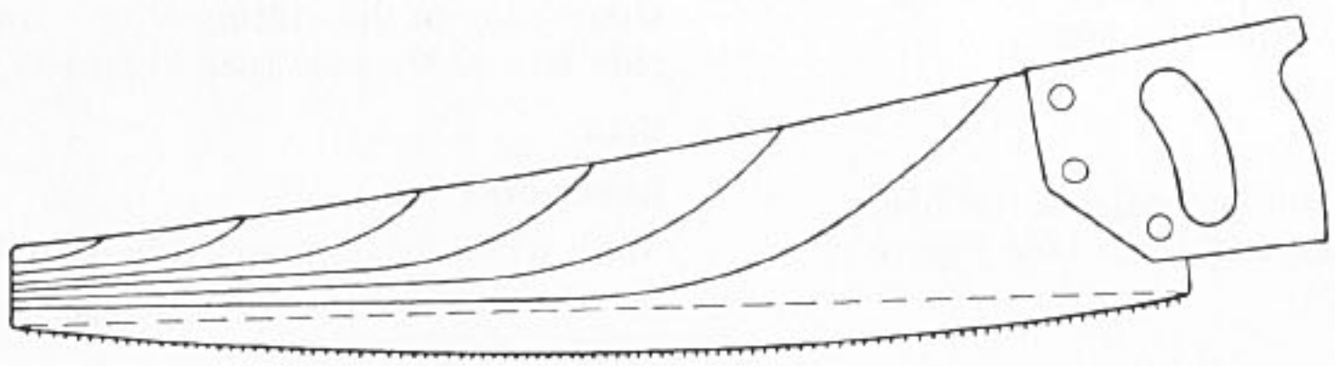


**Figure 2 — Breasted saw**

## 5 Material

### 5.1 Blades

The saw blades shall be manufactured from hardened and tempered carbon or alloy steel to a uniform hardness as follows:

| | |
|---|---|
| a) class 1 saws: | 480 HV30 to 580 HV30; |
| b) class 2 saws: | 460 HV30 to 560 HV30; |
| c) class 3 and 4 saws: | 440 HV30 to 540 HV30. |

The variation in hardness over any one blade shall not exceed 50 HV30 except at the tooth tips of hardpoint saws.

Where hardpoint teeth are specified for class 3 and class 4 saws, the depth of hardening shall not exceed 75 % of tooth depth (see Figure 3).

The hardness of the tooth tip shall be a minimum of 540 HV5 when tested in accordance with BS EN ISO 6507-1.

NOTE The equivalent values on other recognized hardness scales may be used in accordance with BS 860.

### 5.2 Handles

**5.2.1** Handles shall be of the closed type.

**5.2.2** Wooden handles shall be made from a hardwood such as beech. The timber shall be sound, free from defects and properly seasoned within the moisture control range of 5 % to 12 %.

**5.2.3** Plastic handles shall be manufactured from a polymer material which meets the following specification:

a) when tested to BS 2782-3:Method 350 at −20 °C, resistance to impact shall be 2 $kJ/m^2$;

b) when tested to BS 2782-3:Method 320B, tensile yield strength shall be 25 $MN/m^2$;

c) when tested to BS 2782-3:Method 320B, elastic modulus shall be $4 \times 10^{-2}$ $MNm^{-2}$.

The handle shall not exhibit brittle fracture in the temperature range −20 °C to 40 °C when tested in accordance with BS 2782-3:Method 350.

### 5.3 Teeth

**5.3.1** The number of teeth/points per 25 mm shall be in accordance with Table 1 (see also Figure 3). The teeth shall be evenly formed and typical tooth forms are shown in Figure 4.

**5.3.2** The teeth shall be alternately set on either side of the blade. Approximately two-thirds of each tooth measured from the point shall be set, and the method of setting shall be such that the remainder of the blade shall not be deformed.

The amount of set on each side of the blade shall be equal, and shall be related to the thickness of the toothed edge of the blade as follows:

a) *Saws for cross cutting and general use*: not less than one-fifth, and not more than two-fifths the thickness of the toothed edge on each side;

b) *Saws for ripping*: not less than one-quarter and not more than one-half the thickness of the tooth edge on each side.

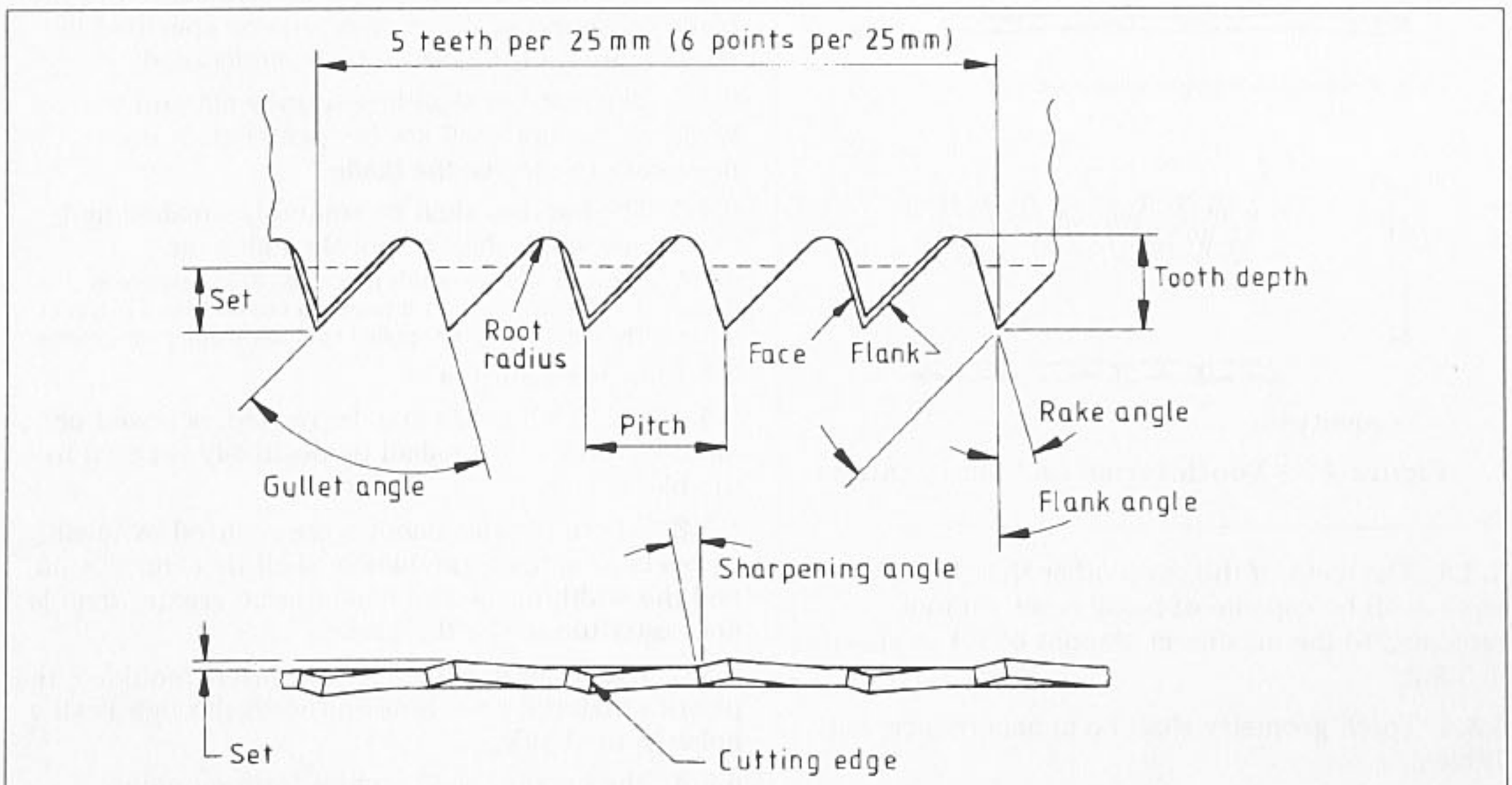



**Figure 3 — Geometry and nomenclature**

Universal teeth — half cross sharpened

Universal teeth — full cross sharpened

Fleam teeth

Rip saw teeth — Straight sharpened

Compound teeth

**Figure 4 — Tooth forms and sharpening**

**5.3.3** The teeth of the saws other than hardpoint teeth shall be capable of being reset without breaking, to the maximum amount of set as specified in **5.3.2**.

**5.3.4** Tooth geometry shall be in accordance with Table 2.

## 6 Proportions and finish

### 6.1 General

Handsaw blades and handles shall comply with the following general requirements and with the specific requirements under each appropriate class, i.e. class 1, 2, 3 or 4 (see clause **7**).

### 6.2 Blades

#### 6.2.1 *Blade proportions*

Blade proportions shall be in accordance with Figure 5.

#### 6.2.2 *Blade thickness*

Blade thickness shall be in accordance with Table 3.

#### 6.2.3 *Finish*

The surface of the blade shall have no hammer marks or other imperfections.

#### 6.2.4 *Corner*

The corner at the intersection of the toe and back shall not be sharp (see Figure 1).

#### 6.2.5 *Straightness*

After testing in accordance with **A.1**, the saw blade shall be visually straight and free from twist.

### 6.3 Handles

**6.3.1** The handles shall be of the closed type.

**6.3.2** The thickness of the handles shall be not less than 22 mm.

**6.3.3** The length of the hand hole shall be not less than 82 mm.

### 6.4 Wooden handles

**6.4.1** The handles shall be positively secured to the blade by means of rivets or screws as specified in the definition of the class of saw concerned.

**6.4.2** The handles shall be centrally slit and the width of the slot shall not be greater than is necessary to receive the blade.

**6.4.3** The handles shall be smoothly finished and, where specified, shall be polished all over.

NOTE For the purposes of this part of BS 3159 a handle is described as "polished" when it has been coated with a polish or lacquer. The coating may be applied by hand, dipping or spraying.

### 6.5 Plastics handles

**6.5.1** Plastics handles may be riveted, screwed or moulded on and they shall be positively secured to the blade.

**6.5.2** Where plastics handles are secured by means of rivets or screws, the handle shall be centrally slit and the width of the slot shall not be greater than is necessary to receive the blade.

**6.5.3** Where plastics handles are insert moulded, the plastics material shall flow and weld through keying holes in the blade.

**6.5.4** The handles shall be free from moulding defects, such as flash, which may cause injury to the user.

**Table 1 — Number of points per 25 mm**

| Nominal size of saw (length of blade) mm | Points per 25 mm | | | |
|---|---|---|---|---|
| | Saws for cross cutting and general use | Saws for ripping | Fleam teeth | Compound tooth |
| 450 | 8, 10 | — | — | — |
| 500 | 8, 10 | — | 8 | 8, 10, 12 |
| 550 | 7, 8, 10 | — | 8 | 8, 10 |
| 600 | 5, 6, 7, 8 | — | 7, 8 | 8, 10 |
| 650 | 5, 6, 7, 8 | 4, 4.5, 5 | 4.5, 5, 6 | 7, 8 |

**Table 2 — Tooth geometry**

Dimensions in degrees

| Saw type | Rake angle | | Flank angle | | Cross-cut angle | | Gullet angle | Top rake angle | |
|---|---|---|---|---|---|---|---|---|---|
| | min. | max. | min. | max. | min. | max. | Nominal | | |
| General and cross-cut saws | 10 | 20 | 40 | 50 | 10 | 30 | 60 | — | — |
| Rip saws | 0 | 10 | 50 | 60 | — | — | 60 | — | — |
| Fleam tooth saws | 20 | 25[a] | 20 | 25[a] | 10 | 30 | — | — | — |
| Compound tooth saw | 10 | 20 | 10 | 25 | 10 | 30 | — | 10 | 30 |

[a] Rake and flank shall be equal.

**Table 3 — Blade thickness**

Dimensions in mm

| Blade raw material thickness minimum | | | | |
|---|---|---|---|---|
| Nominal size | Class 1 | Class 2 | Class 3 | Class 4 |
| 450.00 | 0.86 | 0.86 | 0.71 | 0.71 |
| 500.00 | 0.86 | 0.86 | 0.71 | 0.71 |
| 550.00 | 0.86 | 0.86 | 0.71 | 0.71 |
| 600.00 | 0.94 | 0.91 | 0.89 | 0.89 |
| 650.00 | 0.94 | 0.91 | 0.89 | 0.89 |

## 7 Classes of saw

### 7.1 Class 1

**7.1.1** A class 1 saw is a first grade saw for the use of craftsmen, which shall be skew-backed, taper ground, sharpened, with a wooden handle.

**7.1.2** The blade shall be evenly ground thin-to-back with a taper at the toe of at least 0.06 mm per 25 mm of width (see **3.7**). The minimum thickness at the back of the toe shall be not less than 0.48 mm.

**7.1.3** The blade shall be ground bright and polished.

**7.1.4** The toothed edge shall be straight or breasted.

**7.1.5** The teeth shall be sharpened as follows:

a) saws for cross-cutting: fully-cross sharpened (see **3.10**);

b) saws for ripping: straight sharpened (see **3.12**).

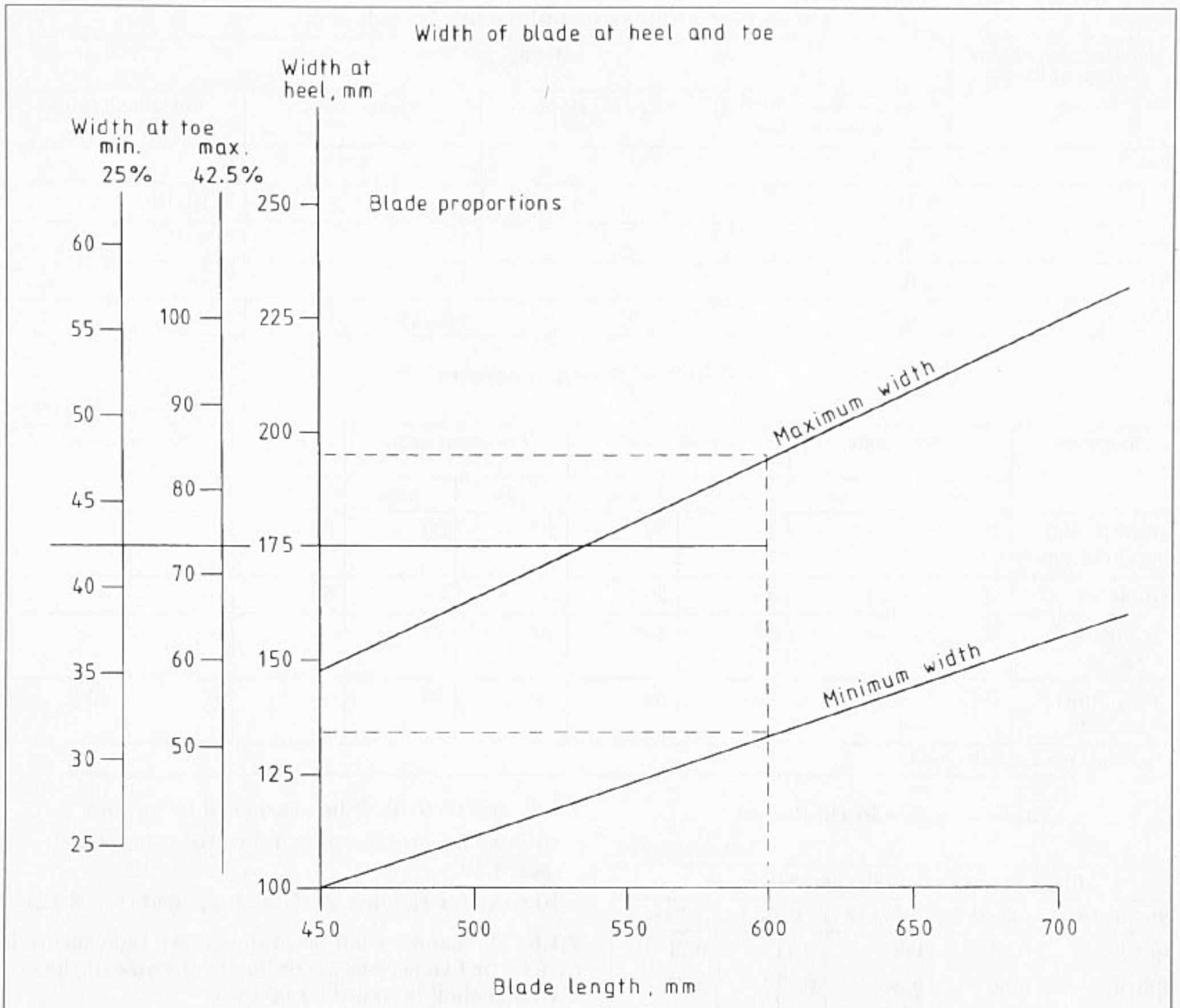
**7.1.6** The handle shall be of the closed type secured by four or five screws according to the size of the saw, and shall be polished all over.

**7.1.7** When tested in accordance with **A.1** the blade shall be capable of being bent in both directions round a test block with a diameter of 250 mm, after which it shall spring back to its original straightness.

### 7.2 Class 2

**7.2.1** A class 2 saw is a good quality saw for the use of craftsmen, which shall be skew-backed, flat or taper ground, sharpened, with a wooden handle.

**7.2.2** The blade shall be flat or taper ground and polished. Where taper ground the minimum thickness at the back of the toe shall be at least 0.13 mm less than the thickness at the toothed edge.




----- Example A: Width at heel of 600 mm blade to be between 135 mm and 195 mm

——— Example B: Width at toe of blade having width at heel 175 mm to be between 43.8 mm and 74.4 mm

**Figure 5 — Blade proportions**

**7.2.3** The toothed edge shall be straight or breasted.

**7.2.4** The teeth shall be sharpened as follows:

a) saws for cross-cutting: half cross sharpened (see **3.11**);

b) saws for ripping: straight sharpened (see **3.12**).

**7.2.5** The handle shall be of the closed type.

**7.2.6** When tested in accordance with **A.1** the blade shall be capable of being bent in both directions round a test block with a diameter of 250 mm, after which it shall spring back to its original straightness.

### 7.3 Class 3

**7.3.1** A class 3 saw is a first grade general duty saw, which shall be straight-backed, sharpened, bright or coated with or without hardpoint teeth and with an injection-moulded plastic handle or a wooden handle.

**7.3.2** The blade shall be flat ground or as rolled.

**7.3.3** The toothed edge shall be straight.

**7.3.4** The teeth shall be sharpened as follows:

a) saws for cross-cutting, straight sharpened (see **3.12**);

b) saws for ripping, straight sharpened (see **3.12**).

**7.3.5** The handle shall be of the closed type.

**7.3.6** When tested in accordance with **A.1**, the blade shall be capable of being bent in both directions round a test block with a diameter of 300 mm, after which it shall spring back to its original straightness.

### 7.4 Class 4

**7.4.1** A class 4 saw, used for general duty in the DIY environment, shall be straight-backed, unsharpened, with a bright or coated finish with an injection-moulded plastics handle or a wooden handle.

**7.4.2** The blade shall be flat ground, or as rolled.

**7.4.3** The toothed edge shall be straight.

**7.4.4** The handle shall be of the closed type.

**7.4.5** When tested in accordance with **A.1** the blade shall be capable of being bent in both directions round a test block with a diameter of 300 mm after which it shall spring back to its original straightness.

## 8 Marking

Hardpoint saws shall be marked, on product or packaging, with a warning that teeth should not be re-sharpened or reset.

NOTE 1 The saw blade may be marked with the manufacturer's name or trademark and the number and year of this British Standard[1)].

NOTE 2 It is strongly recommended that packaging shall carry in some form, pictures and/or words, notes on safety and safe usage, see annex B.

## 9 Tooth edge protection

All finished saws shall have their teeth covered by a sleeve or other suitable tooth edge protection.

## 10 Corrosion protection

The saw blade shall be corrosion protected in accordance with an appropriate British Standard.

## 11 Performance

When tested in accordance with **A.2** the saw shall cut cleanly and freely without binding.

---

[1)] Marking BS 3159-1:1999 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third party certification, which may also be desirable.

## Annex A (normative)
## Tests

### A.1 Bend test

Carry out this test using a cylindrical test block of 150 mm in length and of the appropriate diameter, in accordance with Figure A.1. Place the toe of the saw under a clip on the cylindrical test block and bend round the blade smoothly by hand. Attach the saw handle when this test is carried out.

Hold the saw blade vertically in accordance with Figure A.2.

### A.2 Performance test

Carry out this test using well seasoned oak or other suitable hardwood. Cut the wood first in the direction of the grain, then across the direction of the grain.

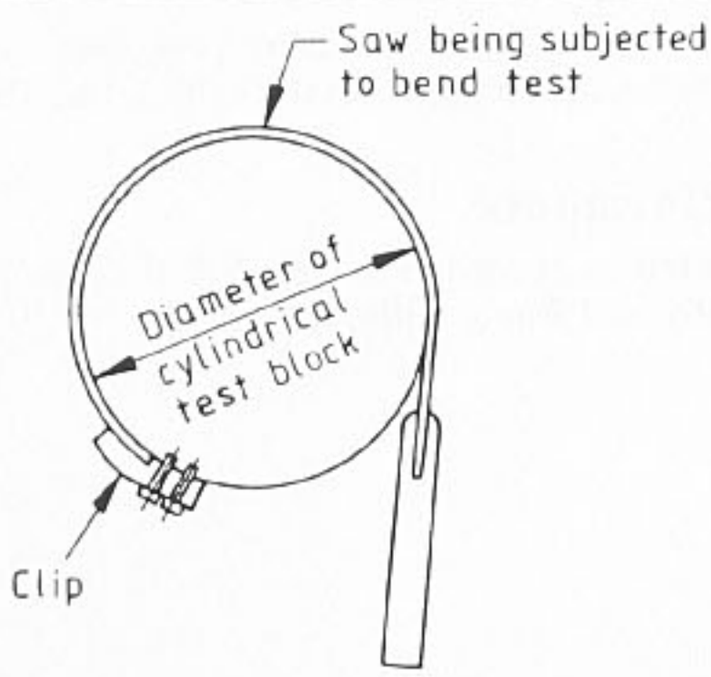



**Figure A.1 — Test rig for bend tests**

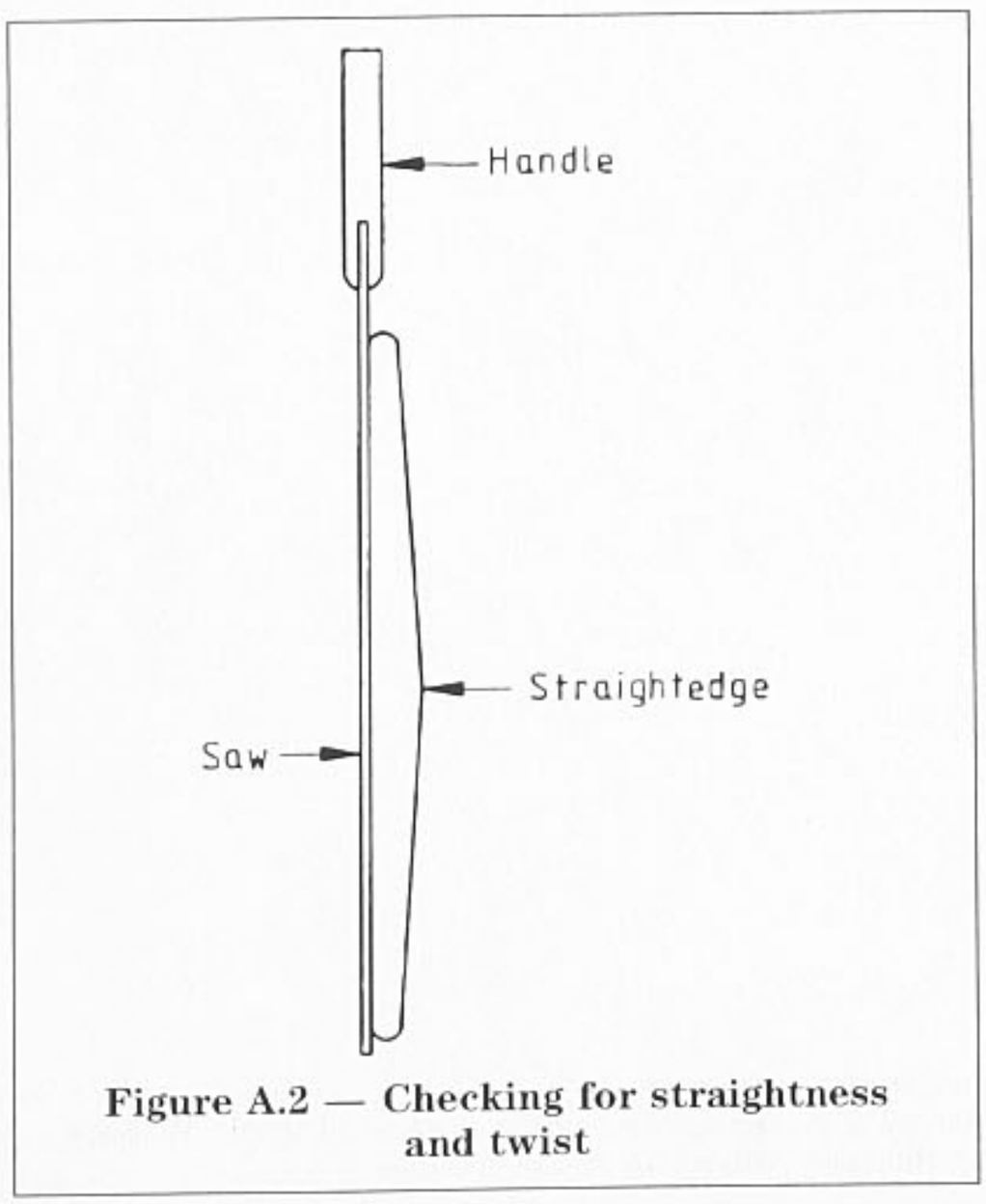



**Figure A.2 — Checking for straightness and twist**

## Annex B (informative)
## Notes on safety and safe usage

CAUTION. Saws are by design extremely sharp.

Hardpoint teeth should not be re-sharpened or reset.

A protective sleeve should always be used on the toothed edge during storage.

The correct saw and appropriate number of teeth (i.e. points per 25 mm) should be selected for the job in question, e.g. for cutting relatively large material, where cutting is the primary requirement rather than accuracy, a large toothed saw, with a lesser number of points per 25 mm, should be selected. For cutting very hard woods such as oak, beech or teak and for greater accuracy, fine teeth, with a greater number of points per 25 mm, should be used.

Wherever possible, the material being cut should be clamped in a vice or other clamping mechanism.

The entire length of the blade should be used with relaxed strokes to ease the workload. The saw should be allowed to cut naturally without the application of undue pressure.

Teeth should be kept sharp and with the right set.

NOTE Some manufacturers offer a saw servicing facility.

Measuring should always be done carefully and saw cut or kerf should be allowed for.

The blade should be wiped clean after use, lightly oiled and stored in dry conditions.

# BSI — British Standards Institution

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: 020 8996 9000. Fax: 020 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 Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

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 and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

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: 020 8996 7002. Fax: 020 8996 7001.

**Copyright**



BSI
389 Chiswick High Road
London
W4 4AL

# Bibliography

## Standards publications

BS 860:1967, *Tables for comparison of hardness scales.*