BRITISH STANDARD

BS 7398 : 1991

Specification for

Hand hacksaw frames

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Handbügelsägen; Bügel

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Machine, Engineers and Hand Tools Standards Policy Committee (MTE/-) to Technical Committee MTE/15, upon which the following bodies were represented:

British Coal Corporation
British Telecommunications plc
Consumer Policy Committee of BSI
Electricity Supply Industry in England and Wales
Federation of British Engineers' Tool Manufacturers
Federation of British Hand Tool Manufacturers
Handle Manufacturers' Association
Institute of Carpenters
Institute of Trading Standards Administration
Institution of Production Engineers
Ministry of Defence

The following body was also represented in the drafting of the standard, through subcommittees and panels:

Building Employers' Confederation

This British Standard, having been prepared under the direction of the Machine, Engineers and Hand Tools Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 28 February 1991

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Foreword

This British Standard has been prepared under the direction of the Machine, Engineers and Hand Tool Standards Policy Committee. It takes into account the specific requirements of the Ministry of Defence and of the British Coal Corporation. Performance tests are given for both hand hacksaw and miniature hand hacksaw frames.

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

Specification

1 Scope

This British Standard specifies requirements for the design, dimensions, and performance of hand hacksaw frames to take blades of nominal length 300 mm complying with BS 1919 and of miniature hand hacksaw frames to take blades of nominal length 146 mm complying with BS 6271.

NOTE 1. Materials are at the discretion of the manufacturer provided that design and performance criteria are met. Normally the working parts are in steel and the handles in either die cast alloy, plastic injection mouldings or shaped wood.

NOTE 2. Restrictions on the use of materials for use underground and in other potentially explosive atmospheres are given in appendix C.

NOTE 3. The titles of the publications referred to in this standard are given on the inside back cover.

2 Definitions

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

2.1 hacksaw frames

Frames designed to take hacksaw blades of nominal length 300 mm.

NOTE. Typical hacksaw frames are shown in figure 1 which also identifies important parts.

2.2 throat depth

The distance between the toothed edge of the hacksaw blade and the lower edge of the bow of the frame (see figure 1 and figure 2 for hacksaw frames and miniature hacksaw frames respectively).

2.3 tension pieces

Those components which link the frame to the blade and through which the tensioning force is applied (see figure 1).

2.4 pin hole

The hole at each end of the blade by means of which the blade is held and tensioned when inserted into a hand hacksaw frame (see figure 1).

2.5 frame

(1) of hacksaw frames. That component which incorporates a handle and tensioning pieces into which the blade is fitted (see figure 1).

(2) Of miniature hacksaw frames. That component which incorporates a handle and blade anchorage slots (see figure 2).

2.6 blade retaining pin

The pin of the tensioning pieces which enters the pin hole of the blade thus enabling blade location and via which the tension is applied via the tensioning mechanism (see figure 1).

2.7 handle

The piece by which the frame is gripped and through which the major cutting forces are applied (see figure 1 and figure 2 for hacksaw frames and miniature hacksaw frames respectively).

2.8 miniature hacksaw frames

Frames designed to take miniature hacksaw blades of nominal length 146 mm.

NOTE. Typical frames are illustrated in figure 2 which also identifies important parts.

2.9 blade anchorage slots/blade retainers

The means by which the blade pins are secured to the frame for tensioning (see figure 2).

2.10 blade tensioning

The means by which the miniature hacksaw blade is tensioned in the frame (see figure 2).

2.11 blade pin

The pin at each end of the miniature hacksaw blade by means of which it is held and tensioned in use.

3 Hand hacksaw frames

NOTE. This clause applies to hand hacksaw frames for use with a hand hacksaw blade of nominal length 300 mm as specified in BS 1919 : 1983.

3.1 Design

3.1.1 The frame shall provide a secure location for the blade parallel to the centre line axis of the frame. The tension pieces shall provide for this alignment along the whole length of the blade thus avoiding blade twist.

3.1.2 The handle shall provide a comfortable grip and isolate the hand from the throat area of the frame.

3.1.3 The frame shall provide a minimum tension of 450 N to the blade achieved within the elastic limit of the frame.

3.1.4 There shall be no rotation of the tension pieces when the blade is loaded to minimum tension.

3.1.5 The frame shall be protected against corrosion and rusting.

3.1.6 Provision shall be made for the retention of all of the components in the case of blade failure or removal.

NOTE. The following additional design features may be included.

(a) Additional blade location, e.g. at 90° to the plane of the frame.

(b) Provision for the acceptance of blade lengths other than 300 mm, e.g. 250 mm.

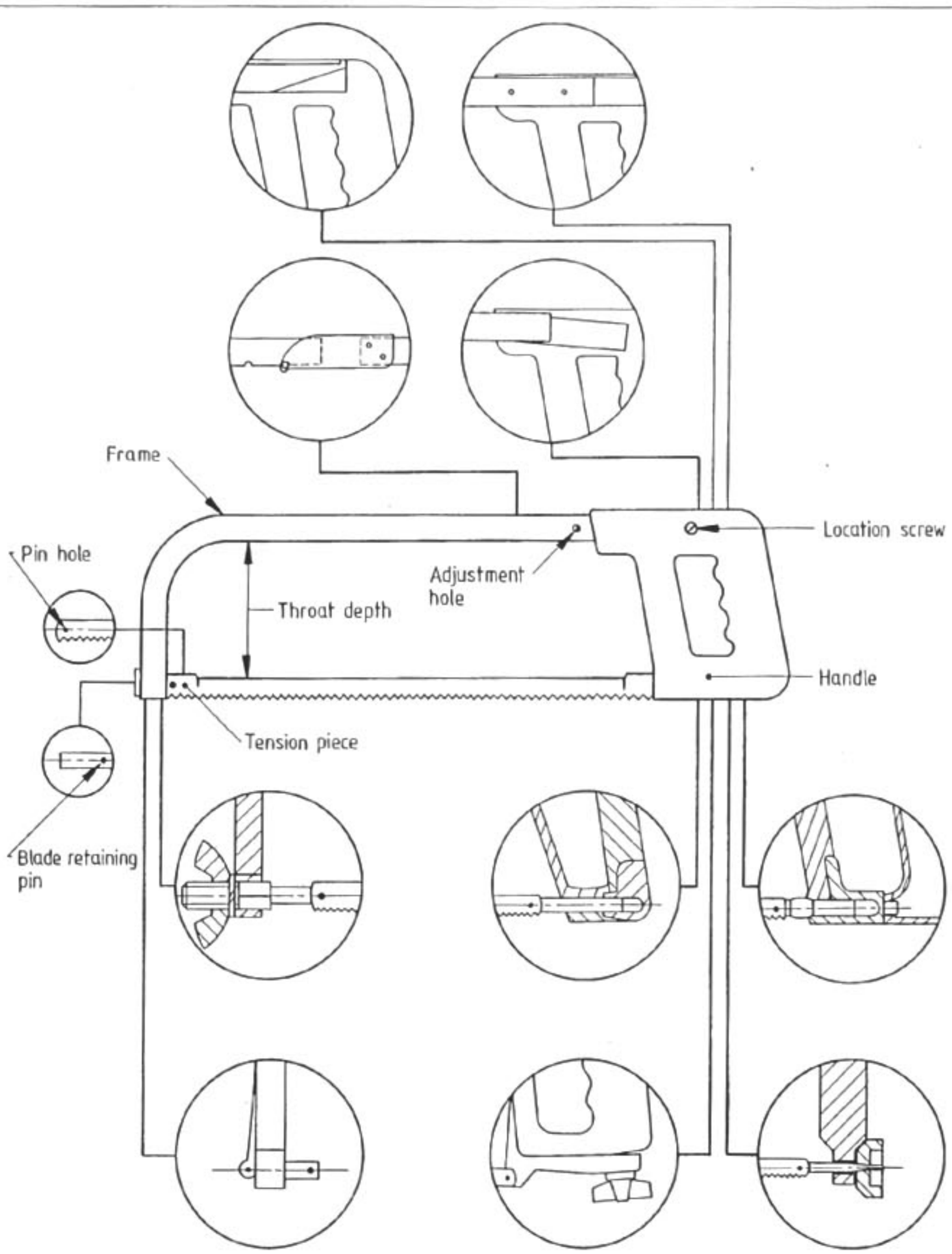
(c) Provision for the acceptance of sawing wires (e.g. tension files and rodsaws).

3.2 Form, dimensions and tolerances

3.2.1 The frame shall accept a hand hacksaw blade as specified in BS 1919 : 1983.

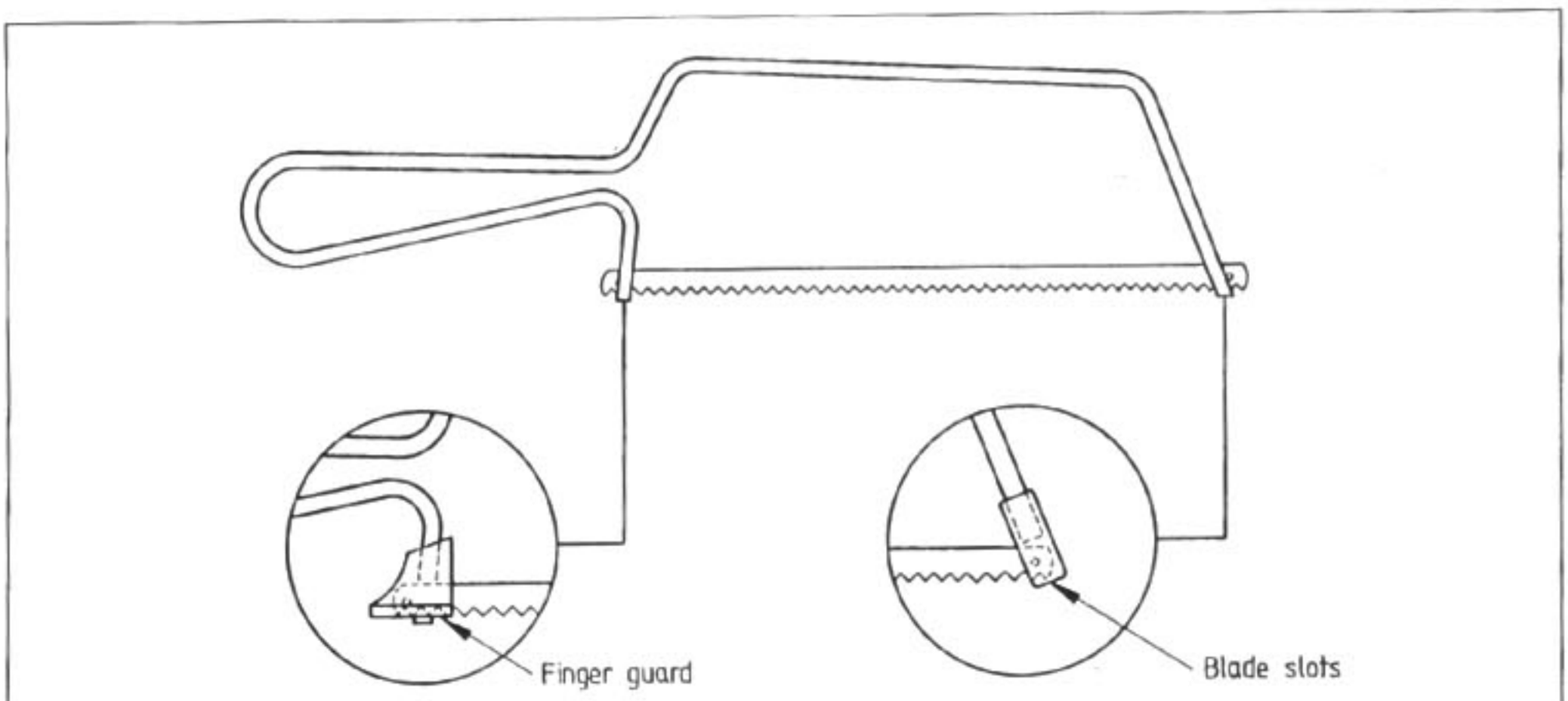
3.2.2 The frame shall have a minimum throat depth of 90 mm.

3.2.3 The handle shall provide a minimum unimpeded grip length of 85 mm.

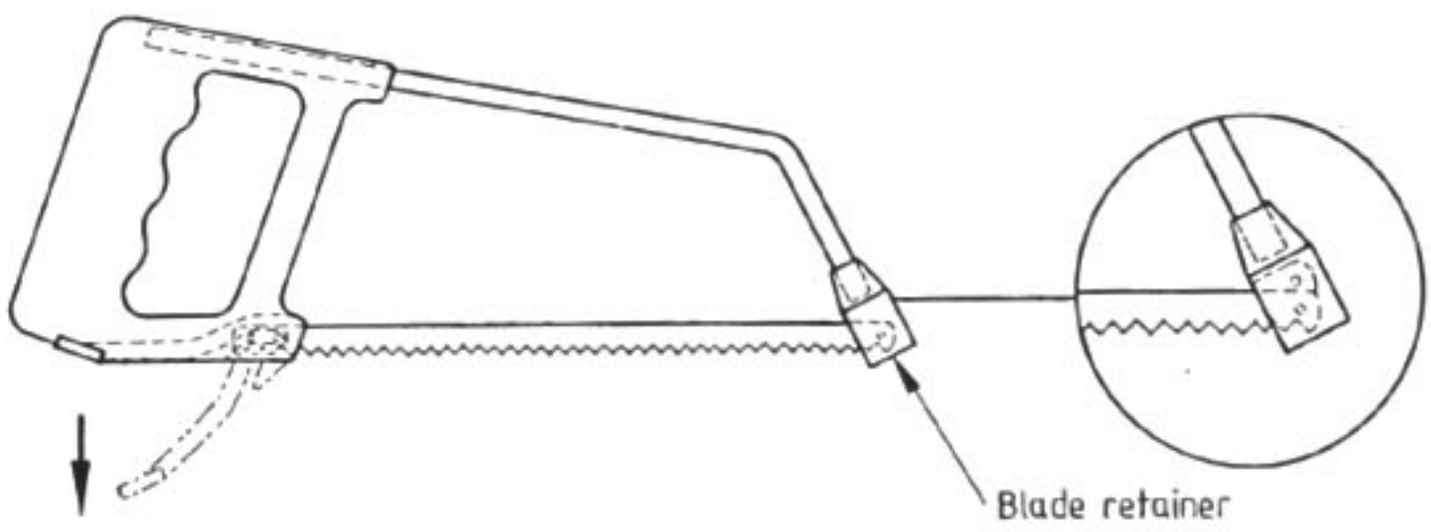


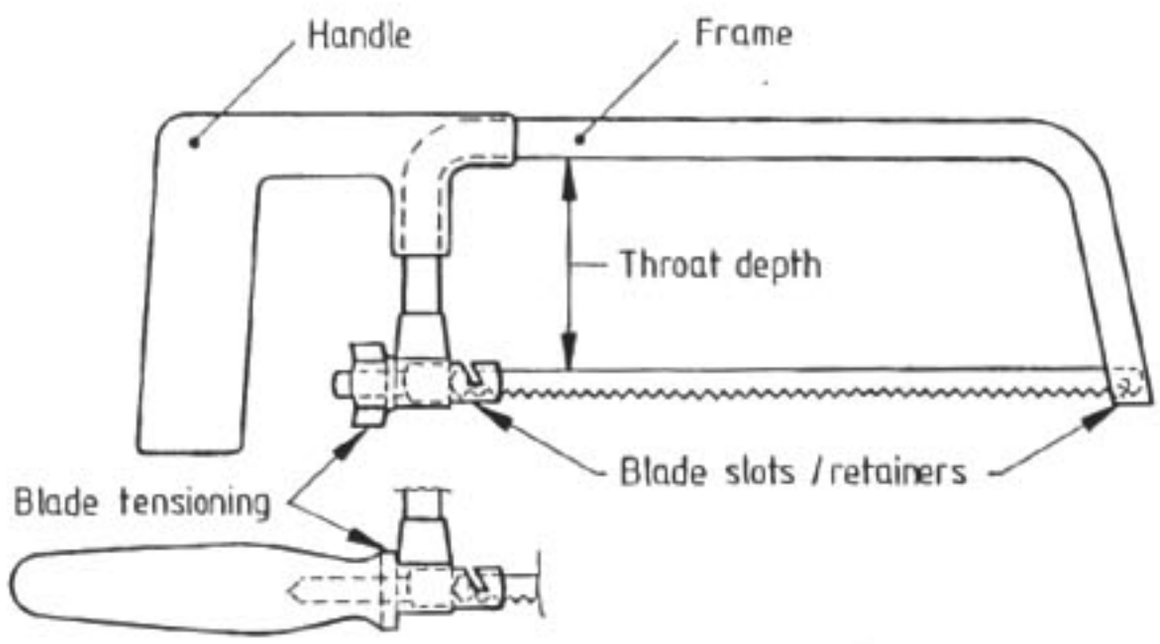
NOTE. Variations in design and means of tensioning are illustrated.

Figure 1. Typical hand hacksaw frame



Type A, integral tension





Type B, with tensioning device

Figure 2. Typical designs of miniature hand hacksaw frames

3.3 Performance

3.3.1 ***General***

When tested in accordance with appendix A the criteria given in **3.3.2** to **3.3.5** shall be met.

3.3.2 ***Tension***

When the frame has been tensioned in accordance with the manufacturers' instructions either by screw, cam or levers the frame shall subject the blade to a minimum load of 450 N and still function within its elastic limit.

3.3.3 ***Lateral deflection***

When the frame has been tensioned to exert a minimum load of 450 N on the blade, the lateral deflection of the frame shall not exceed 3 mm.

3.3.4 ***Tensioning after deformation***

After 4 mm of permanent creep deformation has occurred (a reduction in the distance between the blade retaining pins) the frame shall still be capable of applying a minimum load to the blade of 450 N and shall still comply with **3.3.3**.

3.3.5 ***Creep***

When the frame has been tensioned at ambient temperature to exert a minimum load of 450 N on the blade, the permanent deformation of the frame by creep shall not exceed 0.1 mm per 1000 h.

4 Miniature hand hacksaw frames

NOTE. This clause applies to frames for use with a miniature hacksaw of nominal length 146 mm as specified in BS 6271 : 1982.

4.1 Design

Miniature hacksaw frames shall be of one of the following designs.

(a) *type A, with integral tension*

A simple structure consisting of a single wire component bent to form a frame. The distance between the ends of the frame is of sufficient dimension to allow a blade to be mounted between slots/blade retainers at each end of the wire frame which locate the pins of the blade. The tensioning of the blade is created by the elastic deformation of the frame on insertion of the blade.

(b) *type B, with tensioning device*

This type of frame is a smaller version of a hand hacksaw frame which consists of separate handle and frame and where the tension can be provided by screw or cam action.

NOTE. Type A and type B miniature hand hacksaw frames are shown in figure 2.

4.2 Form, dimensions and tolerances

4.2.1 The frame shall accept a miniature hacksaw blade as specified in BS 6271 : 1982.

4.2.2 Throat depth of the frame shall be 50 mm minimum and the blade shall be held within 10° of the plane of the frame

NOTE. The frame may also accommodate sawing wires (e.g. tension files and rodsaws).

4.3 Performance

When tested in accordance with appendix B the following criteria shall be met.

(a) The frame shall be capable of applying a minimum tension to the blade of 200 N.

(b) The frame shall not creep at a rate in excess of 0.05 mm per 1000 h when loaded to 200 N.

5 Finish

5.1 Plating

When the frame is protected from corrosion by nickel or chromium plating, it shall meet the requirements of BS 1224. When the frame is protected from corrosion by zinc plating, it shall meet the requirements of BS 1706.

5.2 Painting

Where paints are employed for protection purposes, the minimum thickness of coating shall be 75 μm.

5.3 Elimination of defects

The fully assembled hacksaw or miniature hacksaw frame shall be neatly finished and free from burrs, sharp edges and other defects detrimental to the user.

6 Marking

Each frame shall be legibly marked with the manufacturer's name or trademark and the number of this British Standard, i.e. BS 7398[1)].

NOTE. It is recommended that packaging used for the initial supply of hand hacksaw frames and miniature hand hacksaw frames should include safety notes based on appendix D.

[1)] Marking BS 7398 on or in relation to a product represents a manufacturers' 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 therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Appendices

Appendix A. Performance tests for hand hacksaw frames

A.1 Principle

The performance of a frame is assessed by its ability to apply a minimum amount of tension to a blade, to retain that tension with time and to be capable of repeated tensioning operations.

A.2 Description of apparatus

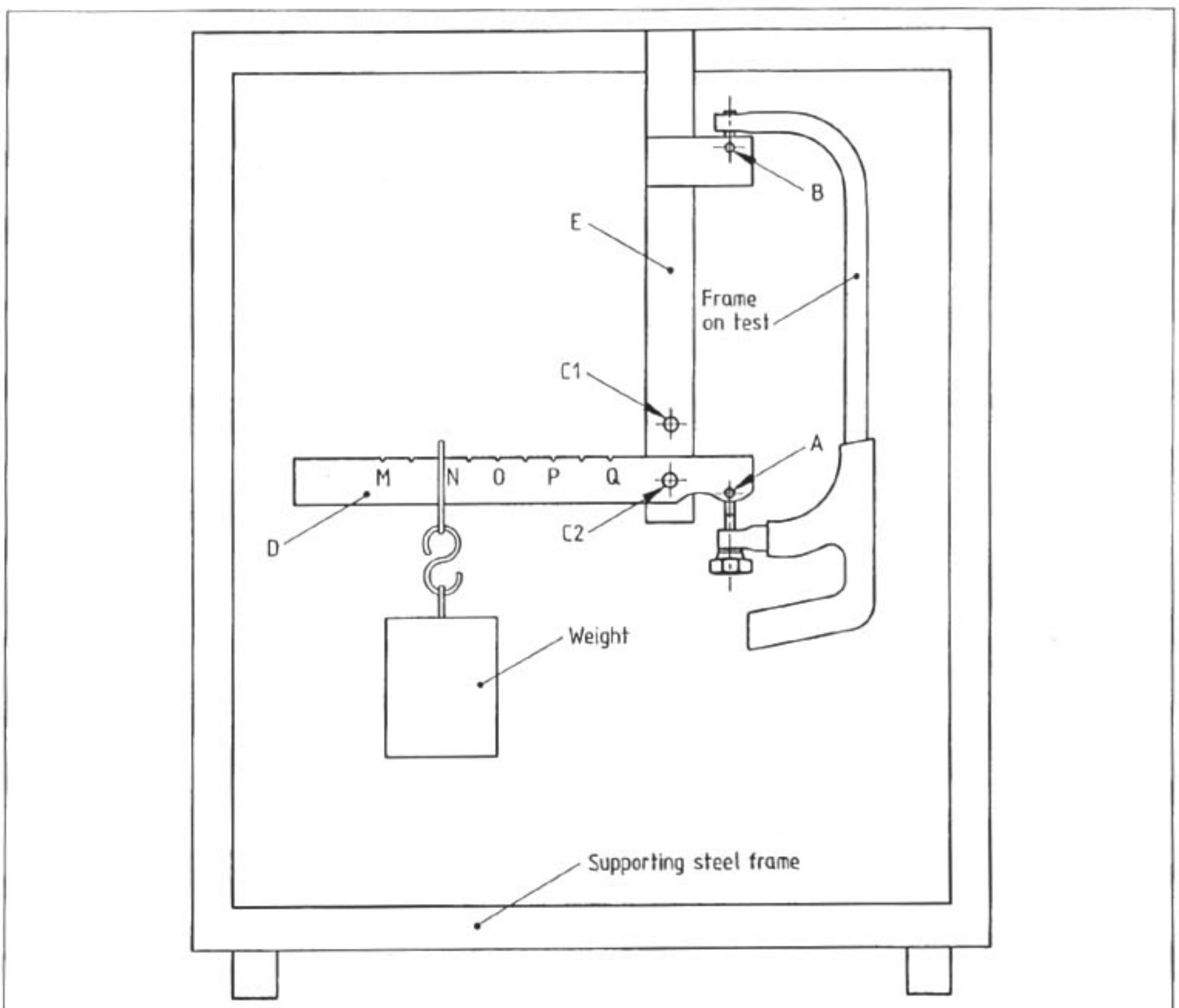
The apparatus shown in figure 3 may be used for conducting the tension performance test on adjustable and fixed hacksaw frames.

NOTE. The letters used to denote positions and apparatus in this clause correspond to those in figure 3.

Positions C1 and C2 on the fixed bar allow the test to be adapted for 250 mm and 300 mm frame sizes. It is essential that the fixed and moving steel bar sections be of sufficient strength so as to avoid deformation when the maximum load is applied at position M.

The apparatus used in this test consists of a fixed steel bar, E, and a moving notched bar, D, of 40 mm × 15 mm section held together pivotally by a steel pin at point C2 or C1.

The distance between the pivot point and A and the pivot point and Q is 50 mm. Further notches are at intervals of 25 mm to M.



NOTE. The letters used in this figure are explained in **A.2**.

Figure 3. Test rig for hand hacksaw frames

The whole arrangement is supported within a rigid steel frame.

A and B are the centre line positions of the blade location pins. The distance between A and B is adjusted by using pivot positions C1 or C2 to accept 250 mm or 300 mm size frames. By placing a weight between positions M and Q various loads can be applied to the frame.

Each notched position represents a load factor. The factor is 1 when the weight is placed at position Q and is increased by 0.5 increments to a maximum of 5 when the weight is placed at position M.

A.3 Test procedure

A.3.1 Position the frame with the blade retaining pins secured at A and B under no load conditions. Adjust the tension mechanism of the frame to bring bar D into the horizontal position. Note the position of the tensioning mechanism (zero position).

A.3.2 Apply a load of 450 N (i.e. by applying a weight of 9.179 kg at position M). Adjust the tension mechanism to return bar D to the horizontal. Measure the lateral deflection of the frame.

A.3.3 Check that the amount of further available movement of the tension mechanism for repeated tensioning to 450 N is 4 mm, i.e. the allowance for permanent creep deformation (see **3.3.4**).

A.3.4 Release the load, reposition the tensioning mechanism to zero position and check that the frame has suffered no permanent deformation, i.e. the frame operates within its elastic limit (see **3.3.2**).

A.3.5 For creep testing load the frame as described in **A.3.2** and record movement against time. Check that the permanent deformation of the frame by creep does not exceed that given in **3.3.5**.

Appendix B. Performance tests for miniature hand hacksaw frames

B.1 Principle

The performance of a frame is assessed by its ability to apply a minimum amount of tension to a blade and to retain that ability over a finite time period.

B.2 Description of apparatus

The apparatus shown in figure 4 or figure 5 may be used for conducting the performance tests on miniature hand hacksaw frames.

B.3 Method

B.3.1 ***Minimum tension***

Measure the frame length between the blade retainers with the frame without a blade fitted. Measure again with a blade fitted, and on the adjustable tension type at full tension. The difference between these two measurements is the maximum frame compression.

Place an empty frame into the test rig (see figures 4 and 5), apply a small load, 2 kg, to remove slack then apply further loads until the frame is compressed to the maximum frame compression. The load required to achieve this compression shall be at least 20 kg.

NOTE. A load of 20 kg is equivalent to approximately 200 N.

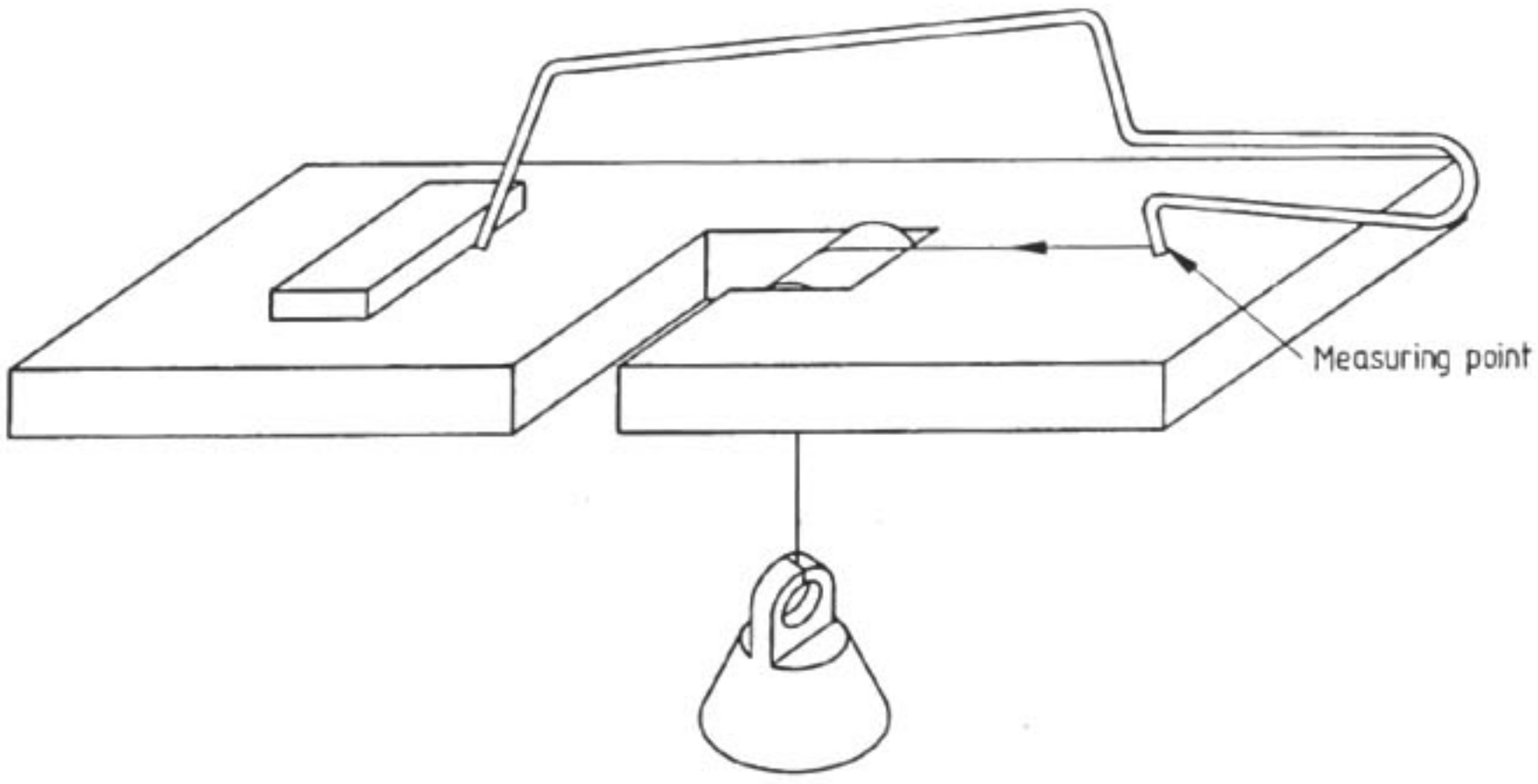


Figure 4. Test rig for miniature hand hacksaw frames

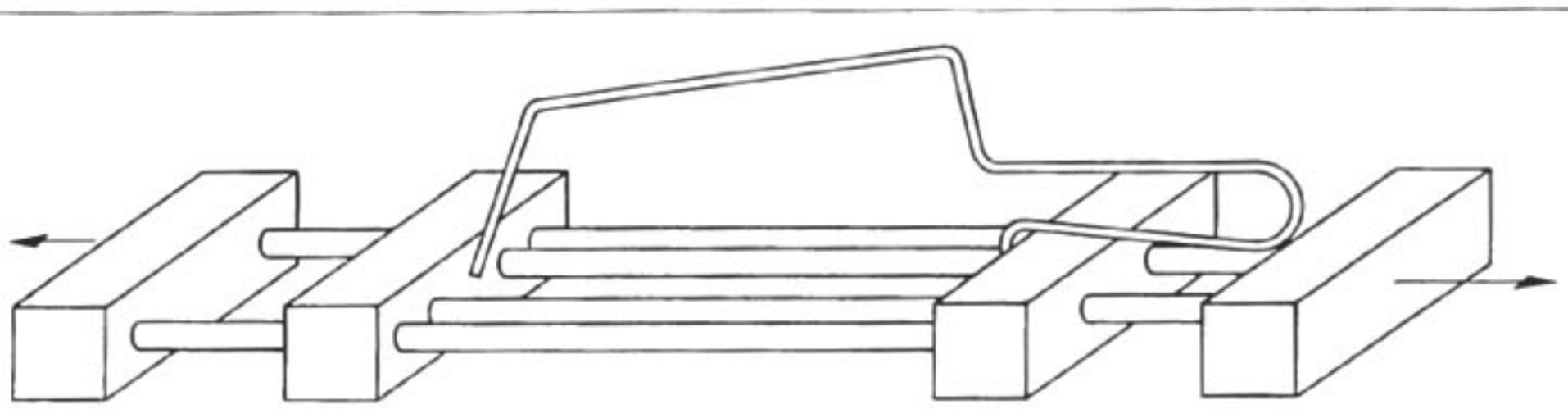


Figure 5. Tensile test rig for miniature hand hacksaw frames

B.3.2 *Creep*

With the frame loaded to 20 kg, record the movement with time using a dial gauge. This should be less than 0.05 mm per 1000 h.

NOTE. The apparatus shown in figure 4 is more suited to this test since on the tensile machine any movement of the frame changes the load.

Appendix C. Restrictions on the use of materials for hacksaw frames for use underground and in other potentially dangerous atmospheres

Impact between certain light metals and rusted steel or iron can create incendive sparks capable of igniting firedamp air mixtures. Restrictions apply to the use of these metals underground and in other potentially dangerous atmospheres.

These light metals comprise aluminium, magnesium and titanium and alloys which include these metals as major constituents.

Alloys which include aluminium and/or magnesium and/or titanium and which may be used without restriction are those in which the total content of these constituents does not exceed 10 % by mass and in which the content of magnesium and titanium together does not exceed 6 % by mass.

No paint or coating containing in metallic form, light metals or alloys of light metals should be used.

Appendix D. Safe usage of hacksaws

D.1 Frame

D.1.1 Always ensure that the frame is correctly tensioned. Follow the manufacturers' instructions. If the frame is tensioned too slack then straight cutting will be difficult. If the frame is tensioned too high then the frame is liable to distort.

D.1.2 After use release the tension on the frame.

D.1.3 Do not use the frame to break off half sawn sections.

D.1.4 Keep screw type tension pieces lightly oiled.

D.2 General rules for sawing

D.2.1 Select the right blade for the material to be sawn as follows:

(a) use low alloy blades for general non-ferrous work;

(b) use high speed steel for ferrous and hard non-ferrous work;

(c) use an all-hard type for the experienced user and where the work piece can be rigidly clamped;

(d) use a bimetal type for sawing at awkward angles or where the work cannot be clamped;

(e) use a flexible blade for the inexperienced user.

D.2.2 Select the right tooth pitch for the section size; the smaller the section the finer the tooth pitch, generally 6 to 12 teeth in contact with the work piece.

D.2.3 When possible ensure that the work piece is securely clamped.

D.2.4 Use a steady, uniform cutting action along the whole length of the blade without excessive use of downward pressure.

D.2.5 Adopt a balanced, comfortable stance during sawing and saw as close as possible to the vice or clamp.

D.2.6 Avoid tilting or twisting the frame during use.

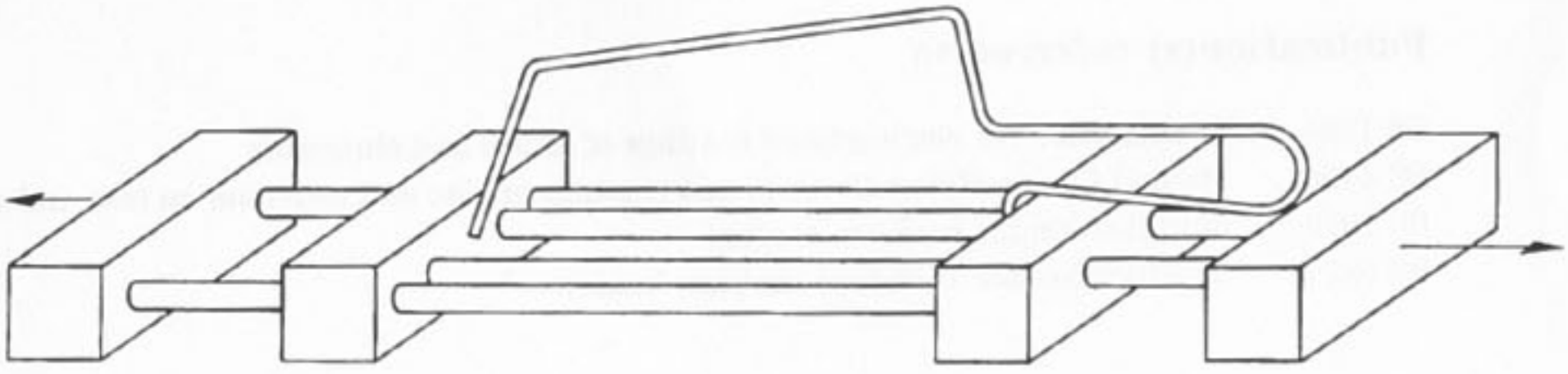


Figure 5. Tensile test rig for miniature hand hacksaw frames

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Publication(s) referred to

BS 1224	Specification for electroplated coatings of nickel and chromium
BS 1706	Method for specifying electroplated coatings of zinc and cadmium on iron and steel
BS 1919	Specification for hacksaw blades
BS 6271	Specification for miniature hacksaw blades

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