

Specification for Hand hammers

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- British Coal Corporation
- British Telecommunications plc
- Consumer Policy Committee of BSI
- Federation of British Hand Tool Manufacturers
- Handle Manufacturers' Association
- Institute of Carpenters
- Institute of Trading Standards Administration
- Ministry of Defence

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Birmingham City Council
- British Engineers Cutting Tools Association
- Department of Trade and Industry
- Home Office
- London Borough of Barking and Dagenham

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Contents

	Page
Committees responsible	Inside front cover
Foreword	iii
1 Scope	1
2 Normative references	1
3 Material	1
4 Forms and dimensions	1
5 Forgings	1
6 Heat treatment and hardness	1
7 Finish	3
8 Mass	3
9 Marking	3
10 Handles	4
11 Fitting and finish of handles	4
12 Dimensions of handles	4
13 Tests	4
Annex A (informative) Guidance on the safe use of hammers	32
Annex B (normative) Tests	32
Figure 1 — Forms and proportions of eyes for the fitting of a handle	2
Figure 2 — Hardness pattern for the ball-end of a ball-pein hammer	3
Figure 3 — Chamfers	3
Figure 4 — Joiner's or Warrington hammer	6
Figure 5 — Engineer's ball-pein hammer	7
Figure 6 — Engineer's cross-pein hammer	9
Figure 7 — Boiler-scaling hammer	10
Figure 8 — Double-face sledgehammer	12
Figure 9 — Straight-pein sledgehammer	14
Figure 10 — Clubhammer	15
Figure 11 — Railway track keyinghammer	17
Figure 12 — Welder's chippinghammer (type A)	18
Figure 13 — Welder's chippinghammer (type B)	20
Figure 14 — Adze-eye clawhammer	21
Figure 15 — Brickhammer (type A)	23
Figure 16 — Brickhammer (type B)	25
Figure 17 — Brickhammer (type C)	27
Figure 18 — Cross-pein pinhammer	28
Figure 19 — Ball-pein pinhammer	29
Figure 20 — Head for steel-shafted clawhammer	30
Figure B.1 — Types of hammer blow	33
Figure B.2 — Pull test	33
Figure B.3 — Nail extraction using a clawhammer	34
Table 1 — Basic analysis range	1
Table 2 — Tolerances on mass (all hammers)	3
Table 3 — Dimensions of heads for joiner's or Warrington hammers	5
Table 4 — Dimensions of wooden handles for joiner's or Warrington hammers	7
Table 5 — Dimensions of heads for engineer's ball-pein hammers	8
Table 6 — Dimensions of wooden handles for engineer's ball-pein hammers	8

	Page
Table 7 — Dimensions of heads for engineer's cross-pein hammers	9
Table 8 — Dimensions of wooden handles for engineer's cross-pein hammers	10
Table 9 — Dimensions of heads for boiler-scaling hammers	11
Table 10 — Dimensions of wooden handles for boiler-scaling hammers	11
Table 11 — Dimensions of heads for double-face sledgehammers	12
Table 12 — Dimensions of wooden handles for double-face sledgehammers	13
Table 13 — Dimensions of heads for straight-pein sledgehammers	14
Table 14 — Dimensions of wooden handles for straight-pein sledgehammers	15
Table 15 — Dimensions of heads for clubhammers	16
Table 16 — Dimensions of wooden handles for clubhammers	16
Table 17 — Dimensions of heads for railway track keyinghammers	17
Table 18 — Dimensions of wooden handles for railway track keyinghammers	18
Table 19 — Dimensions of heads for welder's chippinghammers (type A)	19
Table 20 — Dimensions of wooden handles for welder's chippinghammers	19
Table 21 — Dimensions of heads for welder's chippinghammers (type B)	20
Table 22 — Dimensions of heads for adze-eye clawhammers	22
Table 23 — Dimensions of wooden handles for adze-eye clawhammers	22
Table 24 — Dimensions of heads for brickhammers (type A)	24
Table 25 — Dimensions of wooden handles for brickhammers (type A)	24
Table 26 — Dimensions of heads for brickhammers (type B)	26
Table 27 — Dimensions of wooden handles for brickhammers (type B)	26
Table 28 — Dimensions of heads for brickhammers (type C)	26
Table 29 — Dimensions of wooden handles for brickhammers (type C)	26
Table 30 — Dimensions of heads for cross-pein pinhammers	26
Table 31 — Dimensions of wooden handles for cross-pein pinhammers	28
Table 32 — Dimensions of heads for ball-pein pinhammers	29
Table 33 — Dimensions of wooden handles for ball-pein pinhammers	29
Table 34 — Dimensions of heads for steel-shafted clawhammers	31
Table B.1 — Loads for pull-apart test for steel and fibreglass handle hammers	32
Table B.2 — Loads for pull-apart test for wooden-handle hammers	33
Table B.3 — Loads for bending test for glass fibre reinforced plastics handles for clawhammers	33
Table B.4 — Bending test for glass fibre reinforced plastics handles for non-claw type hammers	34
List of references	Inside back cover

Foreword

This British Standard has been prepared by Technical Committee MTE/15, Hand tools. It supersedes BS 876:1981 which is now withdrawn.

The current revision has been prepared in order to keep abreast of improvements in manufacture and design, to seek improvements in the standards of hammers and to ensure that current types in demand are included.

The British Standards Institution has always appreciated the element of risk attached to the use of striking tools, and in this respect it has continued to work to establish a standard of manufacture in order to ensure that safe tools are available to the user.

However, it is strongly recommended that users should in their own interest ensure that these tools are used only for the purposes for which they are intended.

Particular emphasis is placed on the need to observe caution when striking objects that may have a hardness near to or above that of the hammer head, and to avoid striking glancing blows. In both instances the user may be hit by fragments from the hammer or the object being struck.

The importance of maintaining hammers in a safe condition cannot be overstressed and the user should ensure that striking-faces comply with the requirements of this specification and that handles remain firmly fixed and in a satisfactory condition.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 34, an inside back cover and a back cover.

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1 Scope

This British Standard specifies dimensions, forms and materials for hammers of the following types, together with the dimensions of the handles where appropriate:

- joiners' (or Warrington) hammers;
- engineers' ball pein-hammers;
- engineers' cross-pein hammers;
- boiler-scaling hammers;
- double-face sledgehammers;
- straight-peined sledgehammers;
- clubhammers;
- railway track keyinghammers;
- cross and ball-pein pinhammers;
- welders' chippinghammers;
- adze-eye clawhammers;
- brickhammers;
- steel-shafted clawhammers.

Tests for hammers are also included. Guidance on safe use is given in Annex A.

2 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate points in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

3 Material

All hammer heads shall be manufactured from fully killed forging quality steel, within the following basic analysis range (see Table 1):

Table 1 — Basic analysis range

	C	Mn	Si	P	S
Min.	0.50	0.50	0.10	—	—
Max.	0.60	0.90	0.40	0.050	0.050

The steel shall have a controlled grain size within the range 5 to 8 (McQuaid Ehn).

NOTE 1 Steels conforming to 060 A52, 080 A52, 060 A57, 080 A57, or 070 M55 as specified in BS 970-1:1988 are generally suitable.

NOTE 2 It is recommended that, for heads of mass over 1.8 kg the material specification should include a chromium content of 0.20 % (m/m) to 0.30 % (m/m).

4 Forms and dimensions

The forms of the hammer heads shall be as shown in Figure 3 to Figure 19. The eye shall be centrally located in the width of the head, its F axis (see Figure 1) shall be within $\pm 3^\circ$ (twist) and its J axis at an angle of $90^\circ \pm 1^\circ$ to both axes of the head.

The eye for wooden-handled hammers shall be drifted from one or both sides as illustrated in Figure 1, to leave a central waist. The sizes shall be as given in Table 3 to Table 34. The waist of oval eyes shall be approximately proportional to dimensions *E* and *F*, as shown in Figure 1. The dimensions given for *E* and *F* shall, except where otherwise shown, be subject to a tolerance of $\pm 5\%$.

NOTE Where handles made from materials other than wood are fitted by the manufacturer, the design and the dimensions of the eyes and the techniques employed in the fitting may be modified, provided that the assembly withstands the relevant tests.

5 Forgings

Hammer heads shall be cleanly forged or stamped. They shall be well shaped and free from flaws and seams. All fins and flashes shall be trimmed to surface level. Forgings shall be manufactured in accordance with BS 4114:1967.

6 Heat treatment and hardness

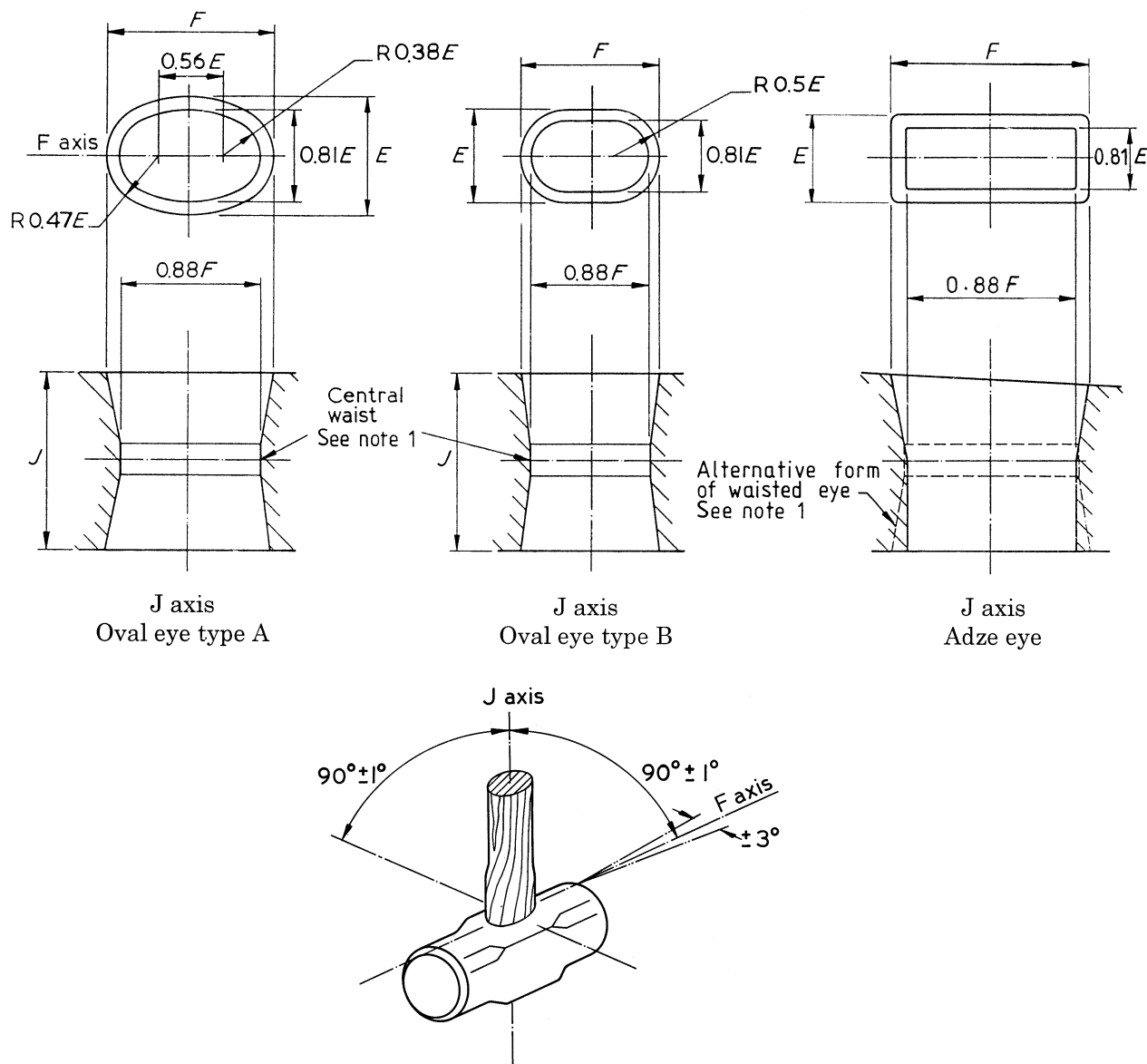
6.1 All hammer heads shall be normalized and the striking-faces shall be dressed to remove decarburization prior to hardening.

6.2 After normalizing the heads shall be hardened on the striking-faces and peins in order to achieve a martensitic structure.

After hardening the heads shall be tempered to reduce the "as hardened" hardness by a minimum of 4 points HRC. The hardness after tempering shall be not less than 50 HRC and not more than 58 HRC.

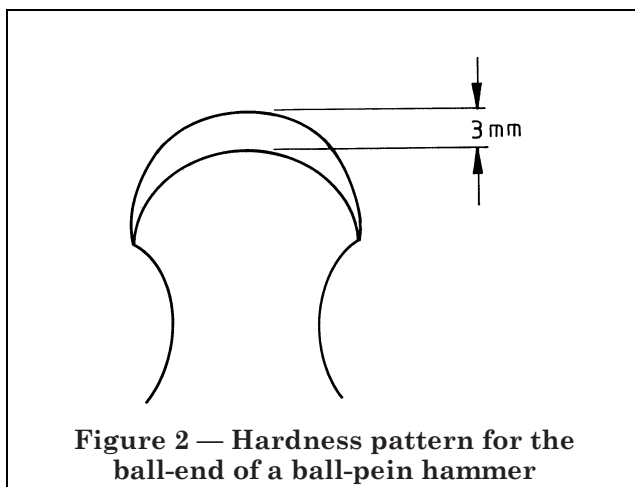
6.3 The hardened zone of the striking-face, (except for ball pein-hammer ball-ends) when measured from any point on the face shall extend to a minimum depth of 3 mm, at which depth the hardness after tempering shall be not less than 46 HRC and be not more than that of the surface.

In the case of ball pein-hammer ball-ends, the 3 mm depth of hardness shall apply only at the centre of the ball along the centre line X-X of Figure 5, tapering towards the ball perimeter to avoid the hardened zone extending into the neck (see Figure 2).



NOTE The depth of the central waist should be a minimum of $0.125 J$ (12 %) and a maximum of $0.33 J$ (33 %).

Figure 1 — Forms and proportions of eyes for the fitting of a handle



6.4 The hardened zones shall not extend into a neck or, where there is no neck, to more than half-way to the near edge of the eye.

6.5 Claws shall be hardened and tempered to conform to 13.3. The hardness shall diminish from the claw tip to the crotch and the hardened zone shall not reach nearer the eye than 12 mm.

6.6 Striking-points and edges shall be hardened and tempered to conform to 13.1.4.

7 Finish

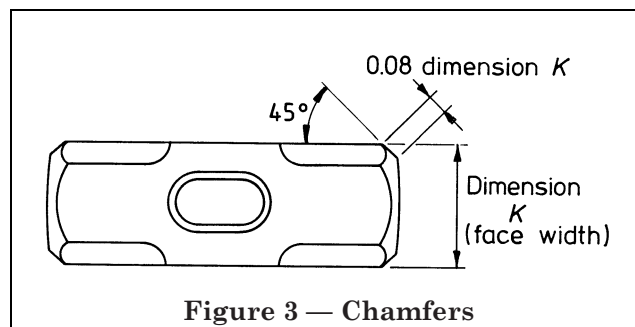
The hammer heads shall be free from material faults, i.e. hardening cracks, surface cracks and shrinkages. Striking-faces, peins and outer faces of the claws as appropriate, shall be smooth and have a bright finish.

NOTE The finish applied to the remainder of the head should be agreed between the purchaser and the supplier.

Striking-faces shall be convex with a maximum convexity of 250 mm radius through the central longitudinal axis.

The striking-face shall have a chamfer at an angle of approximately 45° all round the circumference. The width of chamfer shall be approximately 8 % of the diameter of the striking-face when measured across the chamfer as illustrated in Figure 3.

Clawhammers shall have a chisel-edge ground on the underside of the claw as illustrated in Figure 14.



8 Mass

The nominal mass of the hammer heads shall be as given in Table 2 to Table 34. All masses shall be subject to the tolerances given in Table 2.

Table 2 — Tolerances on mass (all hammers)

Mass of head <i>M</i> g	Tolerance on mass of head
Up to 200	$\pm 0.1M$
Over 200 to 1 000	$\pm (0.05M + 10)$
Over 1 000 to 2 000	$\pm (0.04M + 20)$
Over 2 000	$\pm (0.035M + 30)$
NOTE For example, for a 1 000 g hammer, the tolerance $= \pm (0.05M + 10)$ g $= \pm (50 + 10)$ g $= \pm 60$ g	

9 Marking

Every hammer head shall be clearly and indelibly marked with the following:

- the manufacturers' name, initials or trademark, for traceability purposes;
- the nominal mass of the hammer head;
- the number of this standard, i.e. BS 876:1995¹⁾.

In order to avoid stress concentration, all markings shall be applied to the unhardened part of the head. Additionally, an appropriate durable mark or adhesive label, giving guidance on safe usage of the hammer (see Annex A) shall be affixed to the hammer handle.

¹⁾ Marking BS 876:1995 on or in relation to a product represents a manufacturer's 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 of conformity, which may also be desirable.

10 Handles

10.1 General

When tested in accordance with **13.3** to **13.9** handles shall show no sign of flaws or defects and the hammer head shall remain firmly fixed to the handle.

10.2 Wooden handles

Where solid natural wooden handles are used, they shall be hickory or ash.

NOTE It is strongly recommended that, for added safety, hickory handles should be used for all clawhammers and hammers used for heavy duty.

Handles shall be graded in accordance with BS 3823:1990. All wooden handles shall have a chamfer at the heel.

10.3 Steel handles

Where steel handles are used, they shall be one of the following:

- a) a forged or welded extension of the head;
- b) a seamless or welded steel tube;
- c) another suitable form;

and shall be securely fastened to the head in such a manner that they will not loosen under normal working conditions. There shall be no opening at the eye end of the handle tube when in position in the hammer head.

With the exception of welders' steel hammers, the butt end of steel handles shall have, securely fixed, a grip made of a suitable material that will suffer only minimal deterioration as a result of the action of oil and grease. The minimum length of such grips shall be 165 mm. Their section shall be similar to those specified for wooden handles.

10.4 Glass fibre reinforced plastics handles

Glass fibre reinforced plastics handles shall be moulded in thermosetting type plastics containing a minimum of 60 % glass fibre by mass. They shall be finely finished and well proportioned. Glass fibres shall be continuous, unidirectional and longitudinal. Handles shall be fixed to the head by a chemical adhesive or other means so that they will not loosen.

NOTE A grip may be fitted to the butt end of the shaft, similar to that specified for steel handle. Alternatively a sleeve may be fitted along the full length of the shaft.

11 Fitting and finish of handles

All handles shall be positively and securely fixed and shall be visually square to the head.

All handles shall be smoothly finished and wooden handles shall be lacquered, varnished, or smooth sanded.

Wooden handles shall fully fit the eye.

NOTE When handles of materials other than wood do not fully fit the eye, a ferrule, adaptor or similar device may be used to mask the gap between the handle and the eye opening.

If wedges are used as a means of fixing, either initially or for a replacement handle, the handle shall be wedged and cross-cleated so that the eye of the shaft is spread into the head in all directions. If wooden wedges are used, they shall be as hard as, or harder than, the handle material. Where wedges are used as the means of fixing, the material in the eye should remain clearly visible for any subsequent inspection.

NOTE It is important to understand that the conditions relating to wooden shafts apply at the point of manufacture. Due to the nature of the material and storage conditions (see Annex A), wooden shafts may deteriorate.

All handles shall have a smooth finish at the point where they join the head.

12 Dimensions of handles

The general dimensions of wooden handles shall be those given in Table 4, Table 6, Table 8, Table 10, Table 12, Table 14, Table 16, Table 18, Table 20, Table 23, Table 25, Table 27, Table 29, Table 31 and Table 33.

NOTE Although lengths are not specified for handles made of materials other than wood, such handles should still conform to **10.1**.

13 Tests

13.1 Hardness tests

13.1.1 General

Hardness tests shall be carried out in one of the following ways:

- a) in accordance with BS 891, using a machine that has been verified in accordance with BS 891;
- b) using an alternative method in conjunction with tables for comparison of hardness scales given in BS 860.

13.1.2 Hardness of striking-faces and peins

The striking faces and peins of every hammer shall be tested in accordance with **13.1.1**.

When tested in accordance with **13.1.1** the faces and peins of hammers shall conform to the hardness specified in **6.2**. The test shall be made approximately in the centre of the face.

13.1.3 Claw hardness

The hardness of claws shall be tested in accordance with **B.1**. Following this test, visual examination shall reveal no damage to the claw.

13.1.4 Hardness of striking points and edges

When tested in accordance with **B.2** the striking points and edges of the hammer head shall show no sign of flaw or defects and the head shall be firmly fixed to the handle.

13.1.5 General hardness

The hammer shall conform to the hardness requirements of clause 6.

13.2 Crack test

All hammers shall be inspected for cracks and shall be free from deleterious defects when tested along each axis using magnetic particle flaw detection methods in accordance with BS 6072:1981. The current values used shall be for general engineering applications.

13.3 Soundness and assembly test

When tested in accordance with **B.2** all hammers shall show no sign of flaw or defects and the head shall be firmly fixed to the handle.

Following the test in **B.2**, hammers shall be crack tested in accordance with **13.2**.

13.4 Handle overstrike test

The hammer shall be tested in accordance with **B.3**.

Following the test in **B.3**, each sample hammer shall be tested in accordance with **B.2** after which it shall show no visual sign of flaw or defects and the head shall be firmly fixed to the handle.

13.5 Pull apart test

When tested in accordance with **B.4** the head/handle fitment shall not pull/push apart or loosen during the application or after the specified test load is reached.

Prior to testing, each sample hammer shall have been subjected to the tests described in **B.2** and shall show visual sign of flaw or defects and the head shall be firmly fixed to the handle.

13.6 Handle bending test

When tested in accordance with the test of **B.5**, glass fibre reinforced plastics or steel handles shall show no signs of defects.

13.7 Grip adhesion test

Handle grips shall be so fixed that, after the appropriate cure for any adhesive used, they shall withstand a torque load of 10 N·m. At the end of the test the grip shall remain firmly bonded to the handle.

13.8 Handle clearance test for clawhammers

Clawhammers shall be tested in accordance with **B.6**.

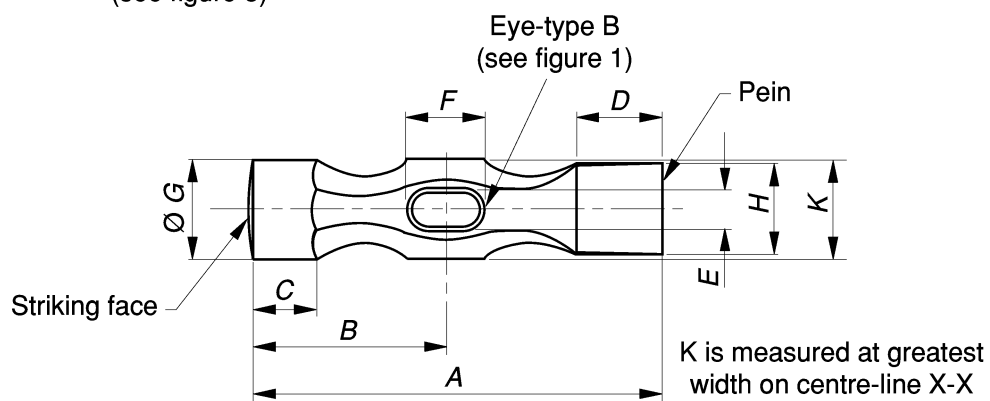
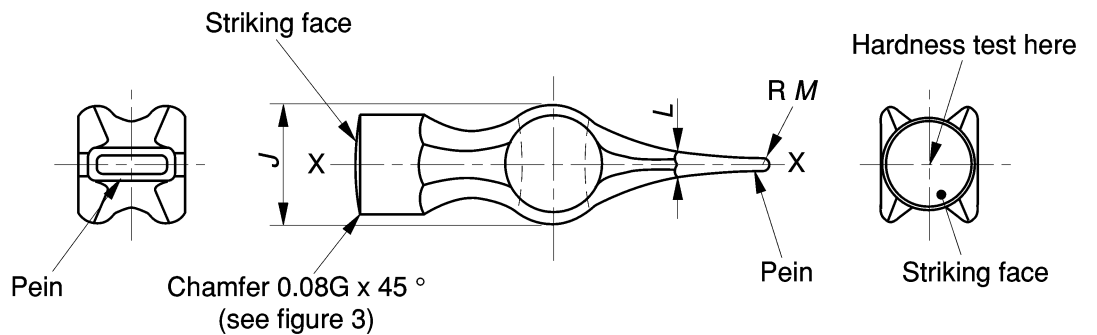
13.9 Nail extraction for clawhammers

When tested in accordance with **B.7** the claw shall show no signs of wear or damage and the handle shall be undamaged.

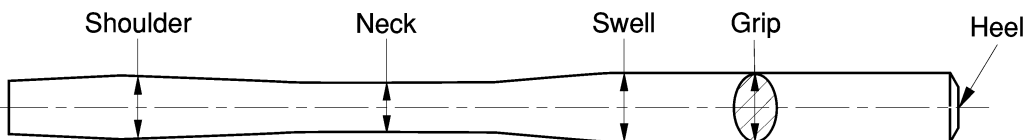
Table 3 — Dimensions of heads for joiner's or Warrington hammers

Nominal mass of head g	Dimensions of head											
	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>	<i>G</i>	<i>H</i>	<i>J</i>	<i>K</i>	<i>L</i>	<i>M</i>
	mm	mm	mm	mm	±5 % mm	±5 % mm	mm	mm	mm	min. mm	mm	mm
170	97	44	16	19	13	19	21	19	24	22	7	4
225	105	51	19	19	13	19	22	21	25	25	8	4
285	114	54	19	22	16	24	25	22	29	27	9	4
340	121	57	19	22	16	24	25	24	32	29	10	4
395	121	57	22	25	19	29	27	24	32	30	10	4
455	124	57	22	27	19	29	29	27	35	30	10	4

NOTE Except for *E*, *F* and *K*, dimensions of head are mean nominal values calculated to give mass within the tolerances of clause 8.



a) Head



b) Handle

Figure 4 — Joiner's or Warrington hammer

Table 4 — Dimensions of wooden handles for joiner's or Warrington hammers

Mass g	Length mm	F × E mm	Shoulder mm	Swell mm	Grip mm	Heel mm
170	275	19 × 13	22 × 16	26 × 20	23 × 17	26 × 20
225	275	19 × 13	22 × 16	26 × 20	23 × 17	26 × 20
285	300	24 × 16	27 × 19	30 × 24	27 × 21	30 × 24
340	300	24 × 16	27 × 19	30 × 24	27 × 21	30 × 24
395	325	29 × 19	32 × 22	32 × 25	29 × 22	32 × 25
455	325	29 × 19	32 × 22	32 × 25	29 × 22	32 × 25

NOTE 1 The minimum dimensions at the shoulder shall be 3 mm larger than the appropriate dimensions for *E* and *F*.

NOTE 2 The overall length shall apply after the fitting of the head and shall/should be to a tolerance of $+\frac{5}{-15}$ mm.

NOTE 3 The grip dimensions shall apply approximately 60 mm from the heel.

NOTE 4 The dimensions of the heel and the swell shall be not less than those of the grip and shall be not more than 3 mm greater.

NOTE 5 The length from the outer end to the shoulder shall be equal to the maximum dimension for *J* according to the nominal mass of the hammer plus an amount sufficient to ensure that wedging is adequate and that the head does not reach to the shoulder.

NOTE 6 The *E* and *F* dimensions for the wooden handles shall be equal to the central waist dimensions of the head eye as specified in Figure 1.

NOTE 7 Unless specified otherwise all handle dimensions shall be subject to a tolerance of $+\frac{3}{-0}$ mm.

