BRITISH STANDARD

BS 3572:1986

*Incorporating Amendment No. 1*

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## Specification for

# Access fittings for chimneys and other high structures in concrete or brickwork

UDC 697.85.012:692.9

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Civil Engineering and Building Structures Standards Committee (CSB/-) to Technical Committee CSB/28, upon which the following bodies were represented:

Agricultural and Allied Workers' National Trade Group
Agricultural Engineers' Association
British Flue and Chimney Manufacturers' Association
Building Employers' Confederation
Department of Agriculture and Fisheries for Scotland
Electronic Engineering Association
Engineering Equipment and Materials Users' Association
Health and Safety Executive
Institution of Civil Engineers
Institution of Structural Engineers
National Federation of Master Steeplejacks and Lightning Conductor Engineers
Refractory Contractors' Association
Suspended Access Equipment Manufacturers' Association
Union of Construction, Allied Trades and Technicians

This British Standard, having been prepared under the direction of the Civil Engineering and Building Structures Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 January 1986



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The following BSI references relate to the work on this standard:
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**Amendments issued since publication**

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# Contents

# Foreword

This revision of this British Standard has been prepared under the direction of the Civil Engineering and Building Structures Standards Committee. It supersedes BS 3572:1962 which is withdrawn. This standard is complementary to BS 3678. For permanently fixed steel ladders, reference should be made to BS 4211.

The standard is only intended to cover suitable materials for the manufacture of fittings described in clause **1**. Recommendations are made for the use of these fittings in appendices.

It is to be noted that better materials are now available for the manufacture of access fittings than some that have been previously used and materials specified in this standard are those that are felt to be the most suitable, but this is not necessarily to be taken as implying that others are completely unsatisfactory. Attention is drawn to the change in the specified thread form from Whitworth to M20 ISO coarse thread, medium fit, and to the recommended precautions.

It is recommended that the specifier, or his representative, be permitted access to where the fittings are made in order that he may examine and sample the materials and the finished fittings. Attention is drawn to the purchaser's right to require a certificate of compliance with this standard and to a possible reference to it in the contract between supplier and purchaser.

The provisions of this standard apply only to normal format bricks since the size and shape of the fittings preclude satisfactory use in thicker units such as concrete blocks.

To ensure to their satisfaction that products claimed to comply with this British Standard consistently achieve the required level of quality, purchasers ordering to this standard are advised to specify in their purchasing contract that the supplier operate a quality system in compliance with BS 5750.

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 to iv, pages 1 to 16, 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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# Section 1. General

## 1 Scope

This British Standard specifies requirements for the following groups of fittings to provide means of access for inspection and maintenance by steeplejacks and similar trades who normally fit their own ladders.

a) Sockets for embedding in concrete and brickwork.

b) Cappings for sockets.

c) Screw-in fittings, i.e. screw-in hooks and screw-in eyes.

The requirements specified for the fittings are in respect of materials, workmanship, design, construction and dimensions.

General recommendations on the methods of use of access fittings are given in Appendix A.

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

## 2 Definitions

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

**2.1**
**access fitting**

a fitting provided to afford access up and down or around a chimney or other high structure, e.g. socket, capping, screw-in fitting or stepiron

**2.2**
**socket**

a metal unit that provides a threaded hole to receive a screw-in fitting and is intended to be built into a chimney or other high structure

**2.3**
**capping**

a flanged plug intended to be screwed into a socket in order to protect the screw thread and the exposed face of the socket between periods of use

**2.4**
**screw-in fitting**

a detachable hook or eye that is intended to be secured by screwing into a socket

**2.5**
**stepiron**

a metal unit that is intended to be built into a chimney or other high structure to provide one of a series of permanent foot steps or hand holds spaced at suitable intervals

## 3 Material quality

All access fittings shall be made from material complying with the ingot tests of the respective British Standards, and when given a visual examination shall be free from surface defects of the exposed face of all fittings and flaws in the screwed thread of access sockets, hooks and eyes.

# Section 2. Sockets for embedding in concrete



NOTE Recommendations on the methods of use of sockets for embedding in concrete are given in Appendix B.

## 4 Materials

Sockets for embedding in concrete shall be cast or wrought from one of the alloys given in Table 1.

**Table 1 — Alloys for sockets**

| BS number | Material | Alloy designation |
|---|---|---|
| BS 1400 | Nickel gunmetal | G3 |
| BS 1400 | 87/7/3/3 leaded gunmetal | LG4 |
| BS 1400 | Aluminium bronze (copper-aluminum) | AB2 |
| BS 2874 | 10 % aluminium bronze copper-aluminium-nickel-iron) | CA104 |
| BS 3071 | Nickel-copper (1 % silicon) | NA1 |
| BS 3076 | Nickel-copper | NA13[a] |

[a] This alloy should preferably be used in the hot-rolled condition.

## 5 Workmanship

Sockets shall be sound and free from laps, holes and sand pitting. Surfaces shall be clean, non-porous and free from sand. Sockets shall be neatly dressed and shall not be burned, stopped, patched or plugged.

A cross section shall be free from porosity, burning or blisters and shall have a homogeneous texture on visual examination.

NOTE Some guidance on examination of cross section is given in Appendix C.

## 6 Design

Sockets shall comply with the following.

a) The shape of the socket shall be such that it will not rotate when in use.

b) The socket, when embedded in concrete, shall provide anchorage without any reliance being placed on the bond between the concrete and the socket.

NOTE 1 Details of sockets which, when tested for anchorage in concrete, have proved satisfactory are shown in Figure 1.

c) The section shall be such as to ensure full compaction all round when embedded in concrete.

NOTE 2 These requirements assume that the socket is built in flush with the face of the structure.

Every socket shall have cast recessed figures and letters 10 mm high as shown in Figure 1.

Every socket shall be provided with a capping that complies with section 4 of this British Standard.

## 7 Construction

If sockets consist of two or more parts (excluding back end plugs) the parts shall be bolted or screwed together.

NOTE It is preferable for sockets to be made in one piece.

The hole for the attachment of the screw-in hook or screw-in eye shall be of the dimensions specified in clause **8** and shall be threaded with an M20 ISO coarse thread, medium fit, complying with BS 3643-2.

If the hole is threaded right through the socket from front to back, a screwed plug made of the same material as the socket shall be inserted in the back end of the socket. The back end of the plug and of the socket shall be flush and the plug shall be secured in position by local deformation, e.g. by centre punching. If a separable flange is used for anchoring the socket, the flange and the screw plug shall be made in one piece.

## 8 Dimensions

The dimensions of the sockets shall be as follows.

a) The clear depth of the hole shall be not less than 80 mm.

b) The length of the thread provided to take the screw-in fittings shall be not less than 55 min.

c) The engagement of a screwed plug shall be not less than 25 mm.

d) The minimum thickness of metal in the wall of the socket measured from the root of the thread shall be 12 mm.

## 9 Greasing

The exposed face of each socket shall be greased.

## 10 Marking

Sockets shall be clearly and indelibly stamped on the face with the following:

a) the number and date of this British Standard, i.e. BS 3572:1986[1)];

b) the number and date of the British Standard[1)] with which the material of the socket complies;

c) the relevant alloy designation, if any, of the appropriate British Standard given in b) for the material from which the socket is manufactured.

NOTE Care should be taken that the indentation is neither too sharp nor too deep.

[1)] Marking BS 3572:1986 or any other BS number on or in relation to a product is a claim by the manufacturer that the product has been manufactured in accordance with the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Enquiries as to the availability of third party certification to support such claims should be addressed to the Director, Quality Assurance Division, BSI, PO Box 375, Milton Keynes MK14 6LO in the case of certification marks administered by BSI or to the appropriate authority for other certification marks.

# Section 3. Sockets for embedding in brickwork

NOTE Recommendations on the methods of use of sockets for embedding in brickwork are given in Appendix B.

## 11 Materials

Sockets for embedding in brickwork shall be cast or wrought from one of the materials given in Table 1.

## 12 Workmanship

The workmanship of sockets for embedding in brickwork shall be in accordance with clause **5**.

## 13 Design

Sockets shall comply with the following.

a) The shape of the socket shall be such as to provide anchorage behind the face bricks.

b) The socket, when embedded in brickwork, shall provide anchorage without any reliance being placed on the bond between the mortar and the socket.

NOTE 1 These requirements assume that the socket is built in flush with the face of the structure.
NOTE 2 Figure 2 shows a typical socket for embedding in brickwork.

Every socket shall have cast recessed figures and letters 10 mm high as shown in Figure 2.

Every socket shall be provided with a capping that complies with section 4 of this British Standard.

## 14 Construction

The construction of the socket shall comply with clause **7**.

## 15 Dimensions

The dimensions of the socket shall comply with clause **8**.

## 16 Greasing

The exposed face of each socket shall be greased.

## 17 Marking

Sockets shall be clearly and indelibly stamped on the face with the following:

a) the number and date of this British Standard, i.e. BS 3572:1986[2)];

b) the number and date of the British Standard[2)] with which the material of the socket complies;

c) the relevant alloy designation, if any, of the appropriate British Standard given in b) for the material from which the socket is manufactured.

NOTE Care should be taken that the indentation is neither too sharp nor too deep.

[2)] See footnote to clause **10**.

# Section 4. Cappings

NOTE Recommendations on the methods of use of cappings are given in Appendix D.

## 18 Materials

A capping shall be made either of the same material as the socket in which it is to be inserted or of polyethylene containing carbon black and complying with type A: class W of BS 3412.

## 19 Workmanship

When the capping is made of the same material as the socket into which it is to be inserted it shall be sound and free from laps, holes and sand pitting. Surfaces shall be clean, non-porous and free from sand. The capping shall be neatly dressed and shall not be burned, stopped, patched or plugged.

## 20 Design and construction

Cappings shall be constructed in one piece and shall consist of a head and a threaded shank. The head of the capping shall be capable of being turned both by a screwdriver and by a person's thumb and forefinger, and shall have a flange of a shape such that the underside of the flange is in contact with the exposed face of the socket when the capping is screwed home.

NOTE Figure 3 shows a typical capping.

## 21 Dimensions

The dimensions of the capping shall be as follows.

a) The diameter of the flange shall be 45 mm.

b) The shank of the capping shall be threaded externally throughout its length with an M20 ISO coarse thread, medium fit, complying with BS 3643-2.

c) The shank shall engage not less than three full threads of the socket into which it is screwed.

d) The thickness of the head of the capping shall at no point be less than 6 mm or more than 8 mm.

## 22 Greasing

The threads and back of the head of each capping shall be greased.

# Section 5. Screw-in hooks

NOTE Recommendations on the methods of use of screw-in hooks are given in Appendix E.

## 23 Materials

Screw-in hooks shall be made from steel complying with grade 070M20 of BS 970-3 or BS 4360. In the normalized condition the steel shall have a minimum tensile strength of 430 N/mm$^2$ and a maximum tensile strength of 500 N/mm$^2$.

NOTE Either of these materials is suitable for use over the normal temperature range of working, but for exceptional use at low ambient temperatures of under 0 °C, steel complying with grade 43E of BS 4360 should be used.

## 24 Workmanship

Screw-in hooks shall be free from obvious defects and shall be cleanly forged in such manner that the macroscopic flow lines follow the body outline of the hook.

The whole of the shank shall be forged in one piece, integral with the hook.

## 25 Heat treatment

Screw-in hooks shall be normalized after the completion of all forging operations by heating them uniformly in a furnace until the whole of the metal has attained a temperature between 880 °C and 910 °C and then cooling them in still air.

## 26 Design

The design of screw-in hooks shall be as shown in Figure 4.

## 27 Construction

Screw-in hooks shall be hot forged by hand out of solid bar.

## 28 Dimensions

The main dimensions of screw-in hooks shall be as given in Table 2.

NOTE Other dimensions given in Figure 4 are consequent and given for guidance only.

## 29 Marking

Screw-in hooks shall be clearly and indelibly stamped on the periphery of the shank between the thread and the curve of the hook with the following:

a) the number and date of this British Standard, i.e. BS 3572:1986[3)];

b) the number and date of the British Standard[3)] with which the material of the hook complies.

NOTE Care should be taken that the indentation is neither too sharp nor too deep.

**Table 2 — Dimensions for screw-in hooks**

| Dimension reference letter[a] | Description | Dimension | Permissible deviations |
|---|---|---|---|
| | | mm | mm |
| *A* | Diameter of bar | 20 | + 1.2<br>– 0 |
| *B* | Thread | M20 ISO, coarse thread, medium fit (BS 3643-2) | |
| *C* | Length of thread | 50 | + 6.0<br>– 0 |
| *D* | Horizontal distance from front end of thread to beginning of curve of hook | 30 | ± 6.0 |
| *E* | Horizontal distance from front end of thread to inside root of curve of hook | 50 | ± 6.0 |
| *F* | Vertical distance from top of shank to top of hook | 58 | ± 6.0 |

NOTE The previous thread form specified was ¾″ Whitworth. It is recommended that a plate, of suitable non-rusting material, which indicates clearly the thread form of the fittings, be permanently attached to the structure adjacent to the lowest fitting. A suitable form is indicated in Figure 9.

[a] As shown in Figure 4.

[3)] See footnote to clause **10**.

# Section 6. Screw-in eyes

NOTE Recommendations on the methods of use of screw-in eyes are given in Appendix F.

## 30 Materials

Screw-in eyes shall be made from steel complying with grade 070M20 of BS 970-3 or BS 4360. In the normalized condition the steel shall have a minimum tensile strength of 430 N/mm$^2$ and a maximum tensile strength of 500 N/mm$^2$.

NOTE Either of these materials is suitable for use over the normal temperature range of working, but for exceptional use at low ambient temperatures of under 0 °C, steel complying with grade 43 E of BS 4360 should be used.

## 31 Workmanship

Screw-in eyes shall be solid forgings without weld. Screw threads shall be cleanly cut, free from checks and imperfections and the finished screw-in eyes shall be free from defect. The screw-in eye forgings shall, prior to screwing, be de-scaled by pickling, sand blasting or other suitable means, in order to detect defects.

## 32 Heat treatment

The screw-in eye forgings shall, prior to screwing, be normalized by heating them uniformly in a furnace until the whole of the metal has attained a temperature between 880 °C and 910 °C and then cooling them in still air.

## 33 Design

The design of screw-in eyes shall be as shown in Figure 5.

## 34 Construction

The screw-in eye shall be hot forged by hand out of solid bar.

The ring end shall be upset forged to the required dimension and the hole shall be hot punched.

## 35 Dimensions

The main dimensions of screw-in eyes shall be as given in Table 3.

NOTE Other dimensions given in Figure 5 are consequent and given for guidance only.

## 36 Marking

Screw-in eyes shall be clearly and indelibly stamped on the periphery of the shank between the thread and the ring with the following:

a) the number and date of this British Standard, i.e. BS 3572:1986[4)];

b) the number and date of the British Standard[4)] with which the material of the eye complies.

NOTE Care should be taken that the indentation is neither too sharp nor too deep.

**Table 3 — Dimensions for screw-in eyes**

| Dimension reference letter[a] | Description | Dimension | Tolerance |
|---|---|---|---|
| | | mm | mm |
| *A* | Minimum diameter of bar from which forged | 20 | + 1.2<br>– 0 |
| *B* | Thread | M20 ISO, coarse thread, medium fit (BS 3643-2) | |
| *C* | Length of thread | 40 | + 6.0<br>– 0 |
| *D* | Length from front end of thread to beginning of ring | 20 | ± 1.6 |
| *E* | Width of side of ring | 12 | + 3<br>– 0 |
| *F* | Diameter of hole | 16 | + 1.6<br>– 0 |
| *G* | Width of ring, overall | 40 | + 6<br>– 0 |
| *H* | Radius of outside arrises of ring | 10 | + 0<br>– 5 |

NOTE Dynamo eyebolts of thread size M20 in accordance with BS 4278 will fit the sockets specified in sections 2 and 3 of this British Standard.

[a] As shown in Figure 5.

[4)] See footnote to clause **10**.

# Section 7. Stepirons for embedding in concrete and brickwork

NOTE Recommendations on the methods of use of stepirons are given in Appendix G.

## 37 Materials

Stepirons shall be made from any one of the alloys given in Table 4.

**Table 4 — Alloys for stepirons**

| BS number | Material | Alloy designation |
|---|---|---|
| BS 2874 | Aluminium bronze | CA104 |
| BS 2874 | Copper-silicon | CS101 |
| BS 2874 | Phosphor bronze | PB102 |
| BS 3076 | Nickel copper | NA13 |

## 38 Workmanship

Stepirons shall be free from manufacturing faults and other defects affecting their strength and utility.

## 39 Design

The design of stepirons shall be as shown in Figure 6.

## 40 Construction

Stepirons shall be made from solid bar.

Stepirons made from wrought copper-silicon, wrought phosphor bronze and wrought nickel copper may be bent hot or cold. Those made from wrought copper-silicon, or wrought phosphor bronze shall, if bent cold, be stress relieved after forming by heat treating the fittings in such a way as to ensure that they are all heated to a temperature of 250 °C for at least 1 h and allowed to cool in still air. Stepirons made from wrought aluminium bronze shall be bent at red heat.

## 41 Dimensions

The main dimensions of stepirons shall be as given in Table 5.

NOTE Other dimensions given in Figure 6 are consequent and given for guidance only.

## 42 Marking

Stepirons shall be clearly and indelibly stamped in the centre of the front face with the following:

a) the number and date of this British Standard, i.e. BS 3572:1986[5)];

b) the number and date of the British Standard[5)] with which the material of the stepiron complies;

c) the relevant alloy reference number, if any, of the British Standard given in b) for the material from which the stepiron is manufactured.

NOTE Care should be taken that the indentation is neither too sharp nor too deep.

**Table 5 — Dimensions for stepirons**

| Dimension reference letter[a] | Description | Dimension | Tolerance |
|---|---|---|---|
| | | mm | mm |
| *A* | Diameter of bar | 30 | ± 1.6 |
| *B* | Internal clearance between projections, on plan | 250 | ± 3.2 |
| *C* | Internal clearance between face of structure and tread, on plan | 200 | ± 3 |
| *D* | Length of horizontal part of built-in portion of legs | 115 | ± 3 |
| *E* | Internal radius of bends (on plan) | 50 | ± 1.6 |
| *F* | Projection of turned-down end from horizontal centre-line | 50 | ± 1.6 |

[a] As shown in Figure 6.

[5)] See footnote to clause **10**.

## Appendix A General recommendations on the methods of use of access fittings

The use of access fittings inside chimneys or other structures carrying corrosive gases is not recommended.

Access fittings, with the exception of stepirons and hand or foot rungs, are intended for the attachment of ladders and are for temporary use only.

For vertical climbs of more than 30 m it is recommended that, for ease of climbing, sockets be installed in preference to stepirons.

In order to obviate any possibility of shearing off the threaded shank, excessive force should not be employed in the insertion of screw-in fittings into the sockets.

A pulley is sometimes rigged from the top of a steeplejack's ladder for the purpose of lifting small loads, principally of materials such as mortar for use in maintenance of the structure. It is important that such loads should be kept as light as possible and in no circumstances should any single load exceed 55 kg.

Hooks and eyes, stand-off irons, lashings and ladders all deteriorate if allowed to remain exposed to the weather. It is important therefore that they should be removed by the steeplejack and carefully stored at the end of each period of inspection or maintenance of the structure. They should be subject to close inspection by a competent person at the termination of such storage before being used again. Any whose serviceability has been adversely affected should be rejected and destroyed to prevent accidental future use.

NOTE Attention is drawn to the requirements of appropriate sections of the Factories Act 1961, the Health and Safety at Work etc. Act 1974 and the Construction Regulations 1961 and 1966. For Northern Ireland the corresponding Acts are:

Factories Act (Northern Ireland) 1965, the Health and Safety at Work (Northern Ireland) Order 1978, and the Construction Regulations (Northern Ireland) 1963 and 1967.

## Appendix B Recommendations on the methods of use of sockets

It is recommended that two vertical rows of sockets be provided so that either of the two traditional systems of laddering, the South of England which uses one row of fixings or the North Country which uses two rows, may be employed according to which is the more convenient for the steeplejack. The sockets should be spaced at 610 ± 10 mm horizontal centres and at multiples of 1.5 m vertical centres with a local tolerance of ± 50 mm which will accommodate the majority of the various widths and lengths of ladder used by steeplejacks.

In order to accommodate ladders 3, 4.5 or 5 m in length, the first set of sockets should be $1\ 200\ ^{+50}_{-0}$ mm above access level.

In detailing vertical lines of sockets on a structure, it should be noted that the topmost set of sockets should be above the topmost horizontal line of hand holds and it is not intended that ladders should be lashed to hand and foot rungs (see Figure 7 and Figure 8).

Owing to the possibility of electrolytic action, the attention of designers of structures is drawn to the necessity of ensuring isolation of the sockets from contact with steel reinforcement and tying wire, e.g. by cranking on the reinforcing bars.

The socket should be built in flush with the face of the structure.

In building sockets into concrete structures, the method of attachment of the socket to the shuttering should be such as to fix the socket securely, so as to obviate displacement of or damage to the socket and to prevent accidental ingress of concrete into the screwed hole in the socket.

It is recommended that the thickness of the concrete cover on the inside of the structure over the metal of the socket should be not less than 30 mm.

It is important that a socket in a concrete structure should be cast into the structure at the same time as the main structural concrete is cast around it and care should be taken that the concrete is fully compacted all around the socket.

It is important that a socket in a brick structure is built in at the same time as the main structural brickwork is built around it. In brickwork the interstices between the bricks and the socket should be kept as small as possible and no reliance should be placed on any strength in the mortar.

A screwed plug or temporary disposable plug (e.g. foam polystyrene) should be installed in the front end of a socket before building it into brickwork to prevent ingress of mortar.

The protective coating of grease on the face of the socket should be applied when the capping is first fitted during the construction and should be restored at the end of each period of inspection or maintenance of the structure, before the capping is replaced.

## Appendix C Examination of the cross section of sockets

Should the purchaser so desire, two or if agreed a minimum of one from the first 100 or less sockets of each batch submitted for examination and one socket for every additional 100 or part thereof beyond 100, may be selected by him or his representative for sectioning and visual examination of the cross section. In the event of any one socket not passing the examination, another socket may be sectioned and examined for each one that has failed, and if any of these sockets fail to pass the examination the batch is deemed not to comply with this British Standard.

NOTE Attention is drawn to the requirements of appropriate sections of the Factories Act 1961, the Health and Safety at Work etc. Act 1974 and the Construction Regulations 1961 and 1966. For Northern Ireland the corresponding Acts are:

Factories Act (Northern Ireland) 1965, the Health and Safety at Work (Northern Ireland) Order 1978, and the Construction Regulations (Northern Ireland) 1963 and 1967.

## Appendix D Recommendations on the methods of use of cappings

The purpose of the cappings is to prevent the ingress of corrosive substances when the sockets are out of use in between periods of inspection and maintenance of the structure.

Cappings should be carefully stored during a period of inspection or maintenance and closely inspected before they are replaced in the sockets. Any capping that has deteriorated so much as to affect its further serviceability should be rejected.

To enable cappings to continue to perform their function effectively it is important that the protective coating of grease on the threads and on the back of the head of each capping should be renewed before it is replaced in a socket at the termination of a period of inspection or maintenance of the structure.

## Appendix E Recommendations on the methods of use of screw-in hooks

The hooks are screwed into the sockets, only one vertical line being used, and the steeplejacks' ladders are then lashed to the hooks. In the traditional South of England system of steeplejacks' laddering, steel dogs are driven into joints in the brickwork in a single vertical line and thus perform a function approximating to that of the screw-in hooks specified in this standard.

Alternations of dry and wet weather during the period of inspection or maintenance of the structure will necessitate adjustment of the lashings to ensure that they are maintained in a tight condition.

In view of possible galvanic action occurring between the ferrous hook and the copper alloy socket with consequent rapid rusting of the former, each hook should be removed after use. The screw-in hooks should be kept by the steeplejacks for use at periods of inspection and maintenance of the structure.

## Appendix F Recommendations on the methods of use of screw-in eyes

As in the traditional North Country system of steeplejacks' laddering, the eyes are screwed into the sockets which have been built into the structure in two parallel vertical lines and a stand-off iron is then inserted in each eye. The steeplejacks' ladders are then fixed to the outer ends of the stand-off irons.

In view of possible galvanic action occurring between the ferrous eye and the copper alloy socket with consequent rapid rusting of the former, each eye should be removed after use. The screw-in eyes and stand-off irons should be kept by the steeplejacks for use at periods of inspection and maintenance.

## Appendix G Recommendations on the methods of use of stepirons

Stepirons are used to form a series of vertical steps, in a straight line, for climbing up chimneys or other high structures and should have sufficient external clearance from the face of the structure to enable a man to put his leg through in order to rest during the climb.

In order to prevent unauthorized access, vertical lines of stepirons should commence not less than 3 m above access level.

The stepirons for climbing the structure should be fixed at not less than 300 mm and not more than 350 mm vertical centres, and should be uniform within a tolerance of ± 10 mm for any one climb.

Stepirons are also suitable for use as the hand holds and walkway for horizontal access around the outside of a chimney or other high structure. They should be evenly spaced at approximately 700 mm between horizontal centres according to the circumference of the structure. The horizontal lines of the hand holds and of the walkway should be spaced at 1 350 ± 25 mm vertical centres (see Figure 7 and Figure 8).

It is important that a stepiron in a concrete structure should be cast into the structure at the same time as the main structural concrete is cast around it and care should be taken that the concrete is fully compacted all around the stepiron.

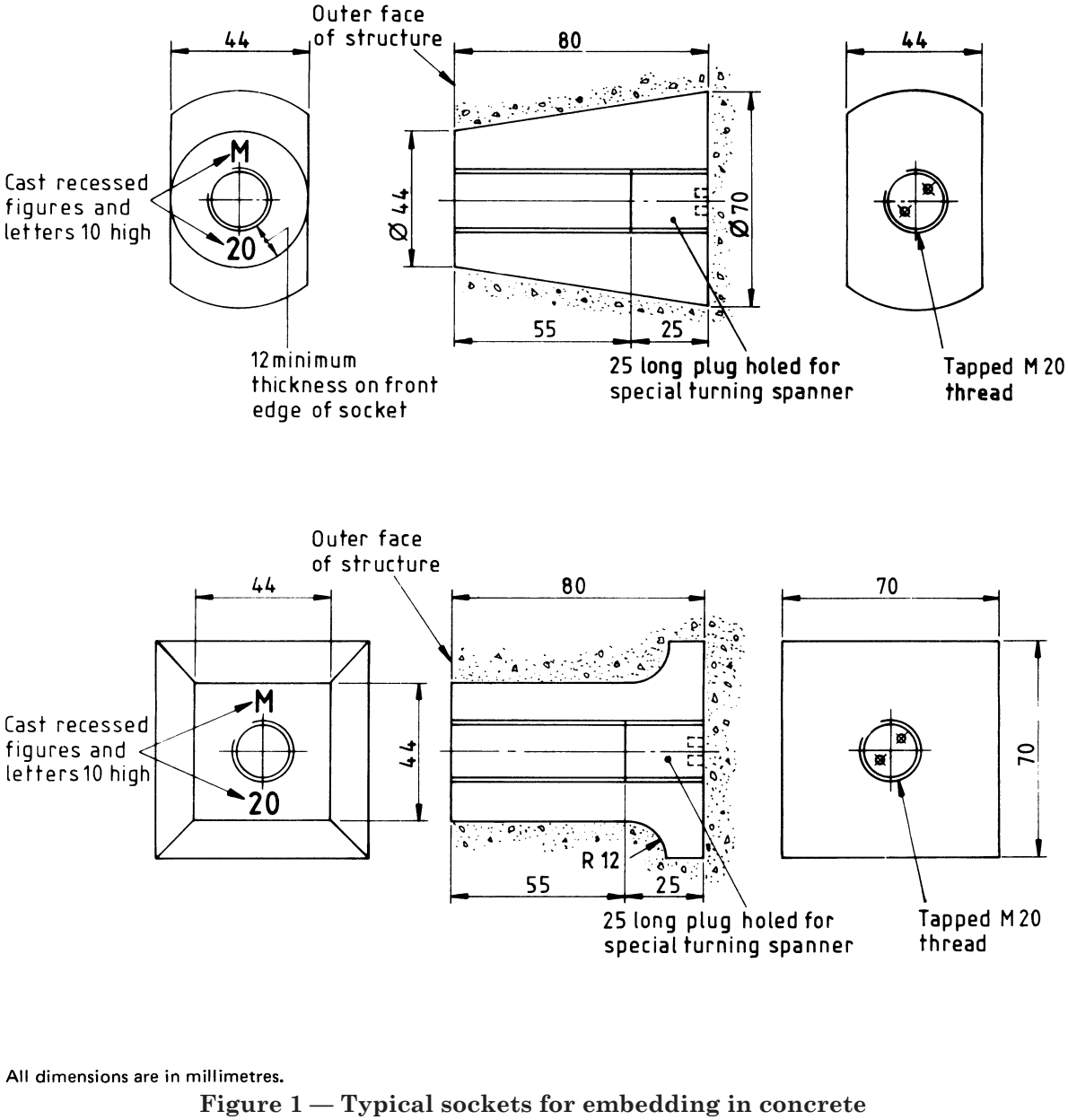
It is recommended that the thickness of the concrete cover on the inside of the structure over the metal of a stepiron should not be less than 30 min.

The use of ferrules with plate and bolt fixing is not recommended.

The use of stepirons inside chimneys or other structures carrying corrosive gases is not recommended and any which may have been built into the inside of a structure as an aid to its construction should be cut off flush with the inside surface of the brickwork or concrete before the structure is put into use.

NOTE Attention is drawn to the requirements of appropriate sections of the Factories Act 1961, the Health and Safety at Work etc. Act 1974 and the Construction Regulations 1961 and 1966. For Northern Ireland the corresponding Acts are:

Factories Act (Northern Ireland) 1965, the Health and Safety at Work (Northern Ireland) Order 1978, and the Construction Regulations (Northern Ireland) 1963 and 1967.




All dimensions are in millimetres.

**Figure 1 — Typical sockets for embedding in concrete**

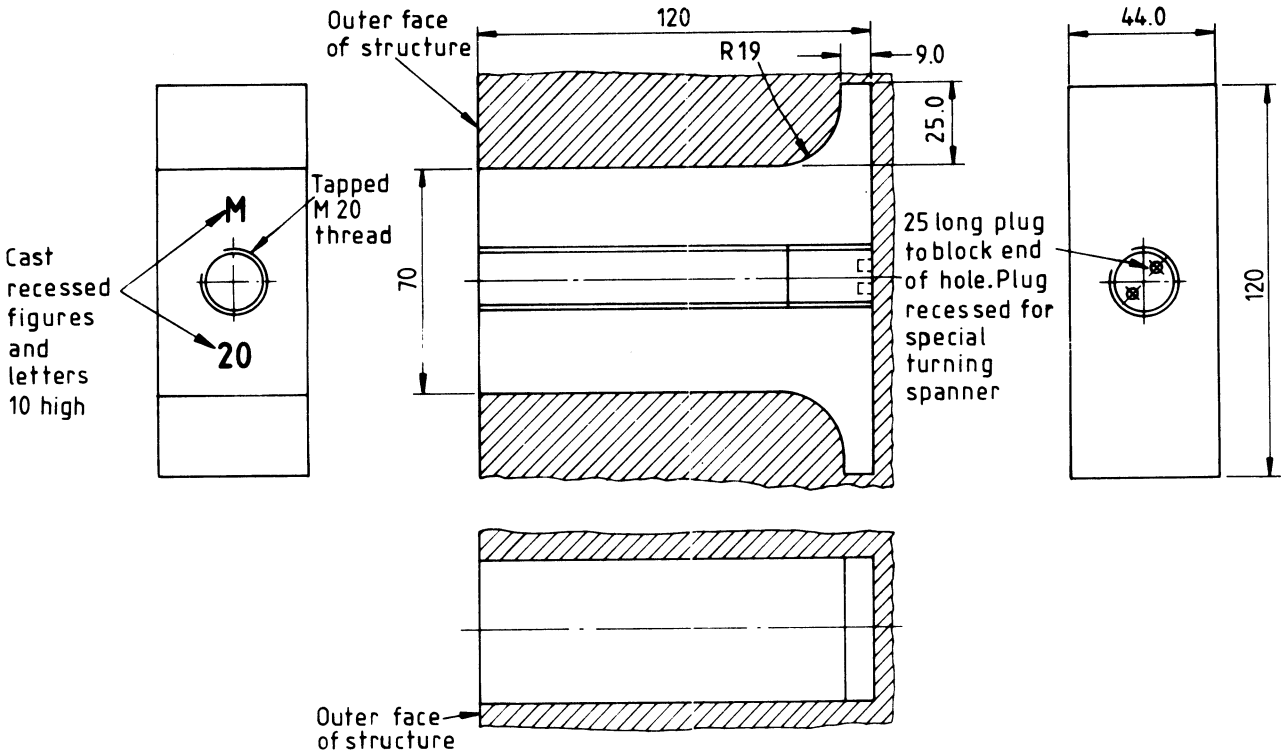



**Figure 2 — Typical sockets for embedding in brickwork**

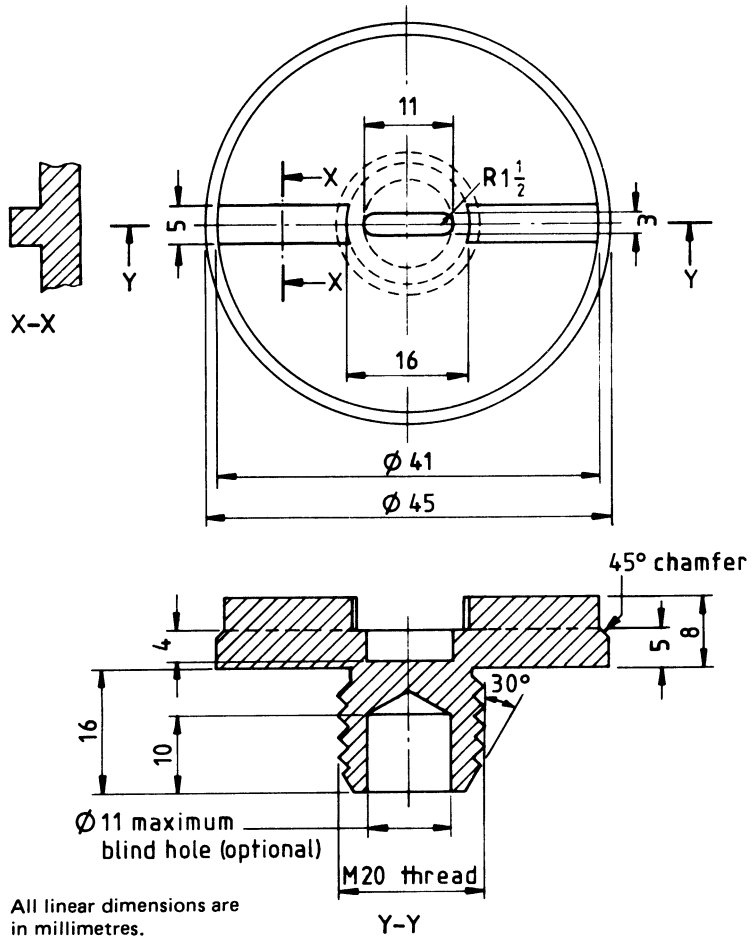



**Figure 3 — Typical capping**

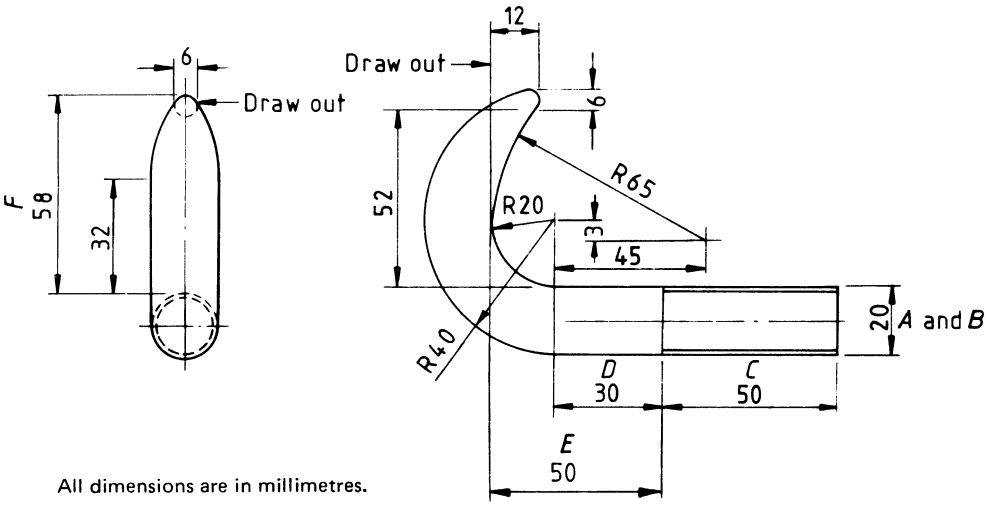



**Figure 4 — Typical screw-in hook**

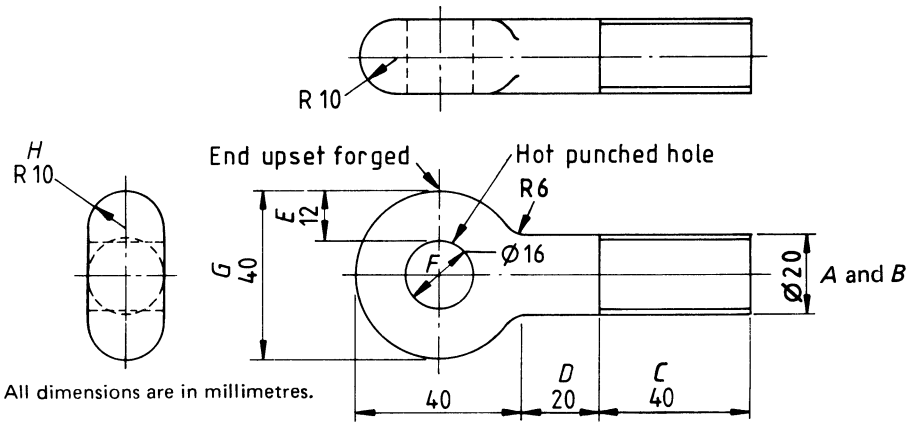



**Figure 5 — Typical screw-in eye**

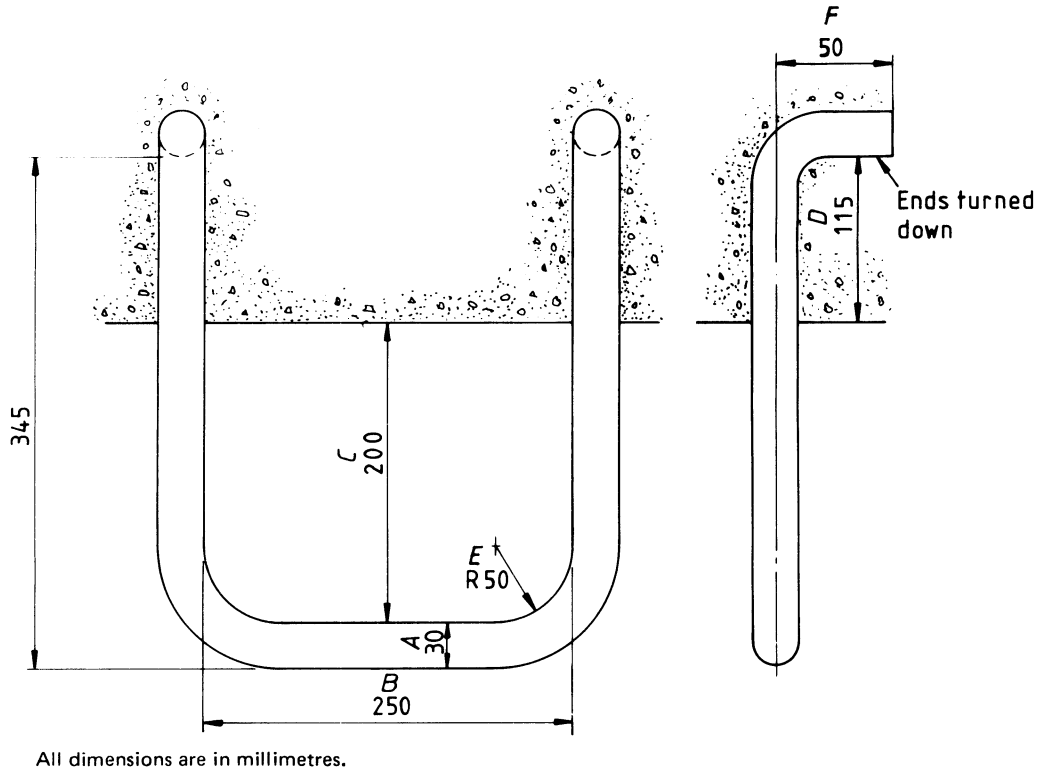
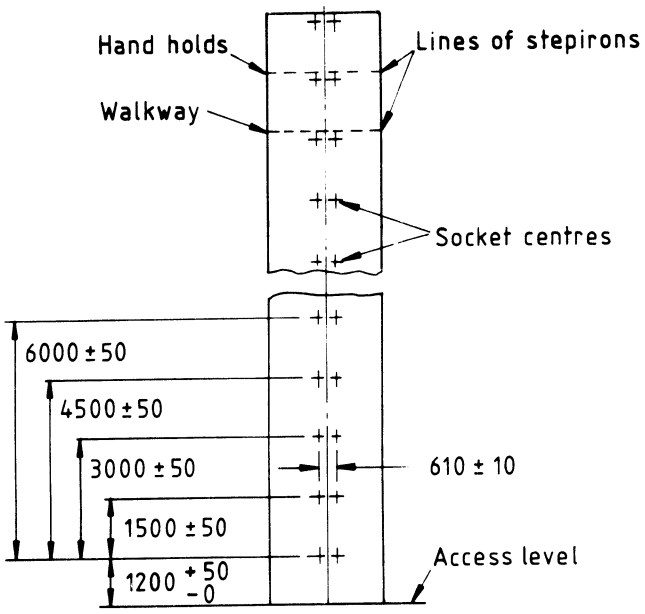
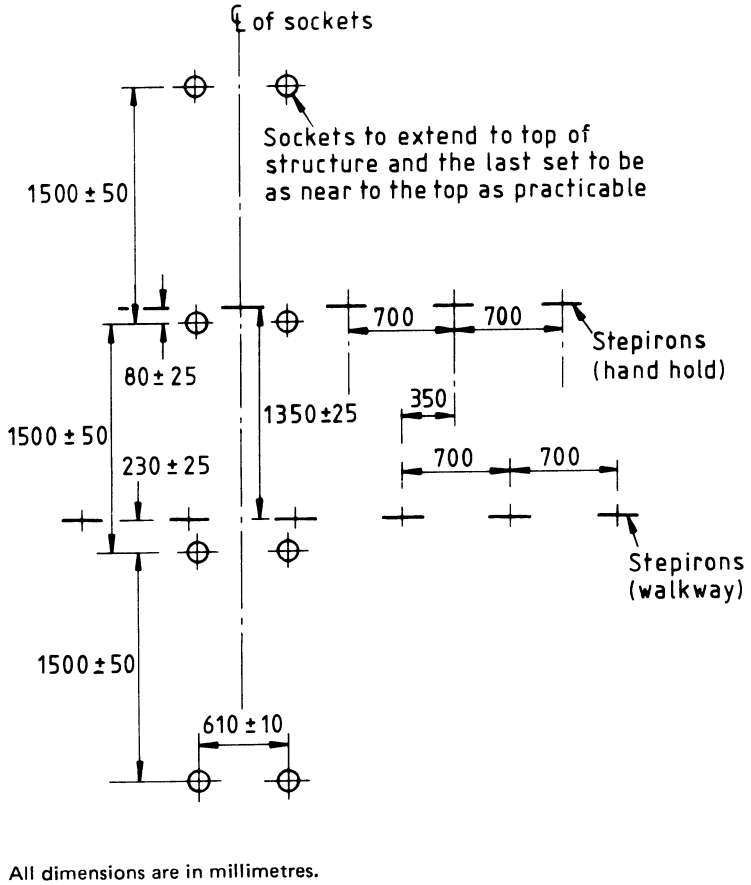



**Figure 6 — Typical stepiron**



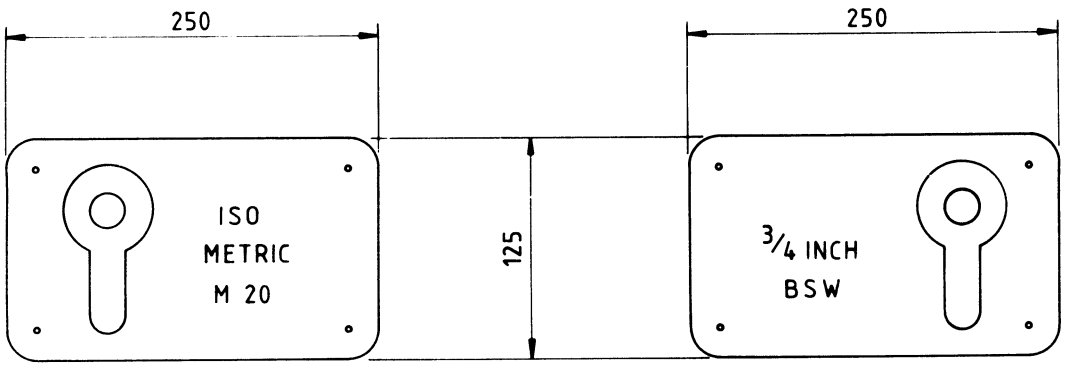

All dimensions are in millimetres.

**Figure 7 — Typical arrangement of sockets and of horizontal access stepirons on a chimney**




All dimensions are in millimetres.

**Figure 8 — Typical arrangement of stepirons on developed face of a structure**




All dimensions are in millimetres.

**Figure 9 — Suitable plate for thread identification**

# Publications referred to

BS 970, *Specification for wrought steels for mechanical and allied engineering purposes.*
BS 970-3, *Bright bars for general engineering purposes.*
BS 1400, *Copper alloy ingots and copper and copper alloy castings.*
BS 2874, *Copper and copper alloys. Rods and sections (other than forging stock).*
BS 3071, *Nickel-copper alloy castings.*
BS 3076, *Specification for nickel and nickel alloys: bar.*
BS 3412, *Polyethylene materials for moulding and extrusion.*
BS 3643, *ISO metric screw threads.*
BS 3643-2, *Specification for selected limits of size.*
BS 3678, *Specification for access hooks for chimneys and other high structures in steel*[6)].
BS 4211, *Steel ladders for permanent access*[6)].
BS 4278, *Specification for eyebolts for lifting purposes.*
BS 4360, *Specification for weldable structural steels.*
BS 5750, *Quality systems*[6)].

[6)] Referred to in the foreword only.

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