# British Standard

BRITISH STANDARD

BS 1247-1: 1990

# Manhole steps —

## Part 1: Specification for galvanized ferrous or stainless steel manhole steps

UDC 628.253.2:692.623.1:669.1:006.3/.8

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Road Engineering Standards Policy Committee (RDB/-) to Technical Committee RDB/35, upon which the following bodies were represented:

Association of London Borough Engineers and Surveyors
British Foundry Association
British Precast Concrete Federation Ltd.
Clay Pipe Development Association Ltd.
Consumer Policy Committee of BSI
County Surveyors' Society
Department of the Environment (Property Services Agency)
Department of Transport (Engineering Policy and Programme Division)
Ductile Iron Pipe Committee
Electricity Supply Industry in England and Wales
Industry of British Foundrymen
Institute of Building Control
Institute of Mechanical Engineers
Institution of Water and Environmental Management (IWEM)
Institution of Works and Highways Management
Water Authorities Association

This British Standard, having been prepared under the direction of the the Road Engineering Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on
30 June 1990



First published July 1945
Second edition November 1955
Third edition September 1975
Fourth edition June 1990

The following BSI references relate to the work on this standard:
Committee reference RDB/35
Draft for comment 87/12372 DC

**ISBN 0 580 18029 8**

**Amendments issued since publication**

| Amd. No. | Date | Comments |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

# Contents

# Foreword

This Part of BS 1247 has been prepared under the direction of the Road Engineering Standards Policy Committee. It supersedes BS 1247:1975 which is withdrawn.

Previous editions of this British Standard specified rigid dimensions for steps. In this revision the concept of performance criteria, based on new test requirements, has been introduced, and only key dimensions are specified.

The range of materials has been increased to include steels; and double steps (also known as "rung" irons) have been introduced. The amount of information to be marked on manhole steps (see clause **8**) has also been increased.

Round bar corner pattern steps are now seldom used and these have been deleted from the standard.

It is intended to follow up this revision with further Parts which will cover manhole steps manufactured from other materials, e.g. plastics encapsulated steel, plastics encapsulated aluminium and aluminium.

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 and ii, pages 1 to 10, an inside back cover and a back over.

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.

## 1 Scope

This Part of BS 1247 specifies the essential dimensions and general requirements for galvanized ferrous or stainless steel manhole steps.

The types of manhole steps are:

a) for general purposes, i.e. in brickwork and in situ concrete;

b) for use in precast concrete manholes and inspection chambers complying with BS 5911.

A summary of items to be agreed between the manufacturer and purchaser is given in Appendix C.

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

## 2 Materials

### 2.1 Iron

The metal used for iron steps shall be either:

a) malleable iron complying with BS 6681; or

b) spheroidal graphite iron (ductile) complying with grades 500/7 or 600/3 of BS 2789:1985.

### 2.2 Steel

The metal used for steel steps shall be either:

a) steel complying with BS 970-1, BS 3100 BS 4360 and BS 4449; or

b) stainless steel complying with grade 316S31 of BS 970-1:1983.

## 3 Design features

### 3.1 Design and dimensions

Steps shall comply with the appropriate dimensions given in Figure 1 to Figure 5. Steps complying with Figure 1 to Figure 4 shall have a minimum section thickness of 5 mm and steps complying with Figure 5 shall have a minimum diameter of 25 mm.

NOTE The steps shown in Figure 1 to Figure 5 are examples only of typical configurations and are not intended to fix design. Figure 1 and Figure 2 are examples of typical single steps and Figure 3, Figure 4 and Figure 5 are examples of typical double steps.

### 3.2 Treads

Treads shall be provided with a slip resistant surface by either ribbing or chequering at least 1.5 mm in height. Minimum requirements are shown in Figure 1 to Figure 5.

Double steps shall have an upstand of at least 20 mm in height and 25 mm in length on each end of the tread to act as a boot stop. For typical examples see Figure 3, Figure 4 and Figure 5.

### 3.3 Locating flange

Steps shall have a locating flange, as shown in Figure 1 to Figure 5, of minimum projection of 5 mm.

## 4 Finish

Iron and steel steps, excluding stainless steel, shall be protected from corrosion by hot dip galvanizing complying with BS 729.

Steps shall be free from projections or sharp edges likely to cause injury.

## 5 Design tests

Steps shall be designed to satisfy the test requirements specified in clause **7**.

## 6 Quality control tests

Sample steps shall be tested for compliance with the requirements given in **7.1** and **7.2** at the rate of one per 5 000 or one per day for each type whichever is the greater.

## 7 Test requirements

### 7.1 Twist

When supported on three props of equal height on a level surface, as shown in Figure 6, the height *(H)* of the front edge of the thread from that surface shall not vary along its length by more than 3 mm for a single step or more than 5 mm for a double step.

### 7.2 Bending

When tested in accordance with Appendix A the step shall support a load of 2.5 kN without cracking and the deflection shall not exceed 5 mm. After removal of the load the residual deflection shall not exceed 1 mm.

NOTE The residual deflection is intended to allow for a bedding-in factor and not for yield in the material. The graphical plots of load against deflection should exhibit a straight line relationship, i.e. loading within the elastic range of the material.

### 7.3 Pull out test

When tested in accordance with Appendix B, steps shall resist a force of 7.5 kN.

## 8 Marking

Each step shall be clearly and permanently marked with the following identification in a manner which is visible after installation:

a) the number and date of this British Standard, i.e. BS 1247-1:1990[1)];

b) the manufacturer's identification;

c) the material code using the following cyphers

M : malleable iron

D : ductile iron

S : steel

SS : stainless steel

d) the tail length in millimetres.



[1)] Marking BS 1247-1 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 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.

## Appendix A Bending tests

### A.1 Apparatus

**A.1.1** *Test block,* 75 mm in diameter, faced with hard rubber or other resilient material.

**A.1.2** *Device capable of applying a load* of at least 25 % greater than the appropriate load specified in **7.2**. Testing devices should comply with the accuracy requirements for grade 1 or grade 2 testing machines given in BS 1610.

If applicable the calibration of the testing device should be checked in accordance with BS 5781-1.

**A.1.3** *Clamping device* for holding the step (a typical apparatus is shown in Figure 7).

NOTE Clamping blocks should be shaped to the profile of the tail of the step.

**A.1.4** *Device suitable for measuring deflection.*

### A.2 Procedure

Clamp the test sample firmly so as to leave the design projection acting as a cantilever.

Apply the load centrally and normal to the tread as shown in Figure 7 at a rate of 2.5 kN per min.

Apply the initial load up to 2.5 kN and hold for 1 min. Remove the load and take a reading at the centre of the tread to establish a datum from which to measure deflection.

Repeat the test for two cycles and for each cycle note the deflection at each 0.5 kN increment up to the maximum of 2.5 kN. Maintain the load for 1 min.

Remove load and record the residual deflection.

## Appendix B Pull out test

### B.1 Apparatus

**B.1.1** *Hydraulic or mechanical equipment* capable of exerting a force in excess of 20 kN and with a means of measuring the load.

**B.1.2** *Concrete mould* capable of producing test blocks either 100 mm × 100 mm × 250 mm long or 100 mm × 100 mm × 500 mm long.

### B.2 Procedure

**B.2.1** Cast step into a mortar block (see **B.2.2**) and allow to cure for at least 10 days before testing.

The block for a single step should be 100 mm × 100 mm × 250 mm long.

The block for a double step should be 100 mm × 100 mm × 500 mm long.

NOTE Tails longer than 100 mm are permitted to protrude from the bottom of the mortar block or may be cut off.

**B.2.2** The mortar mix shall be a 3 : 1 ratio by weight of Leighton Buzzard sand, fraction A (see BS 4550-5) to OPC Standard blend cement. Free water cement ratio shall be 0.40.

**B.2.3** Apply the force between centre of the front tread of step and mortar block and apply load. Apply the force gradually and without shock and sustain load for a period of 1 min.

NOTE If failure occurs by a fracture or by a shear cone failure of the block this does not necessarily constitute failure of the step and a re-test is required.

## Appendix C Information to be given by the purchaser in his enquiry and order

The following information should bc given by the purchaser in his enquiry and order:

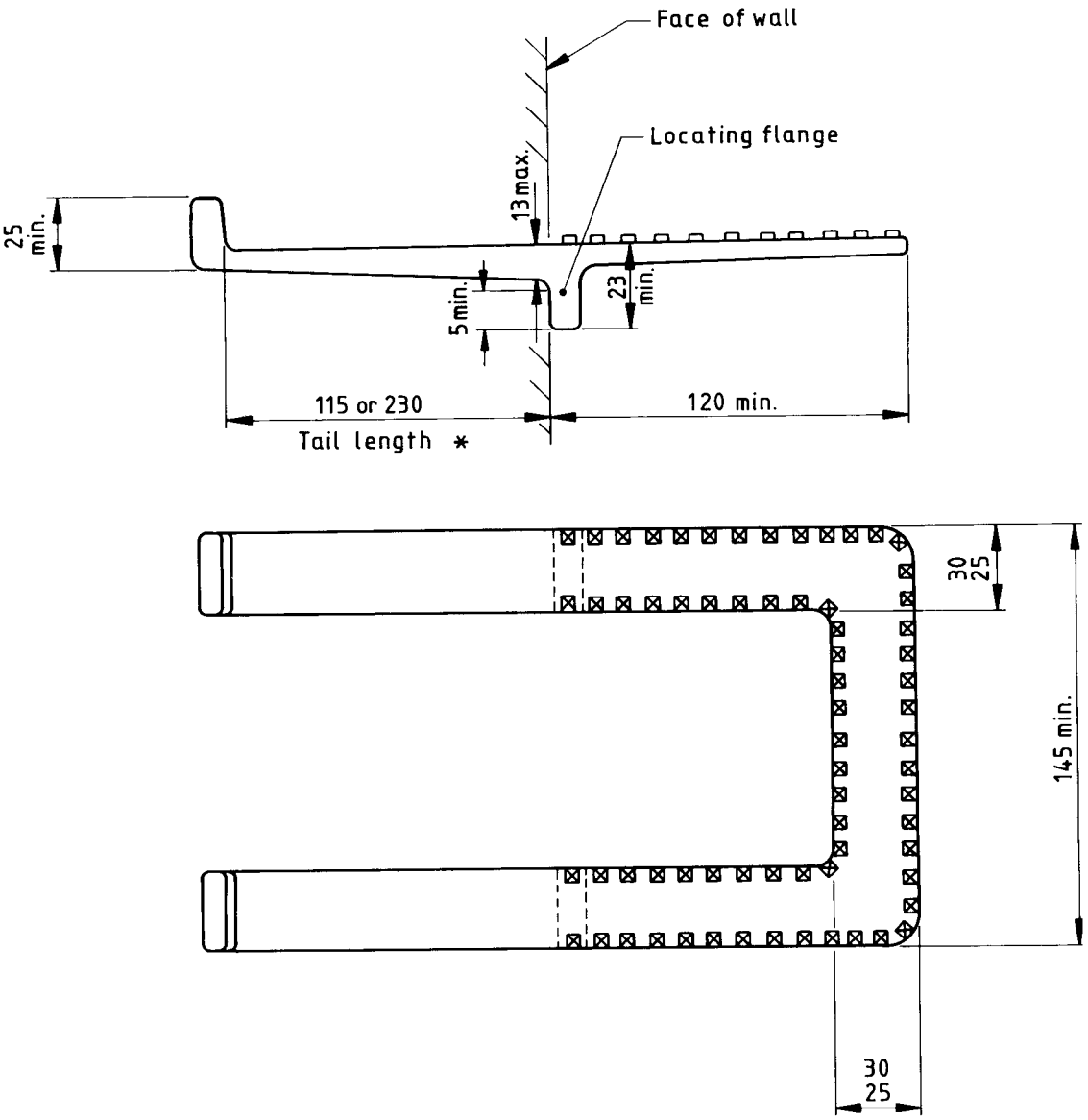
a) type of step;

b) length of tail where applicable;

NOTE 35 mm and 50 mm refer to precast concrete manhole steps and 115 mm and 230 mm refer to general purpose manhole steps.

c) if a manufacturer's test certificate is required;

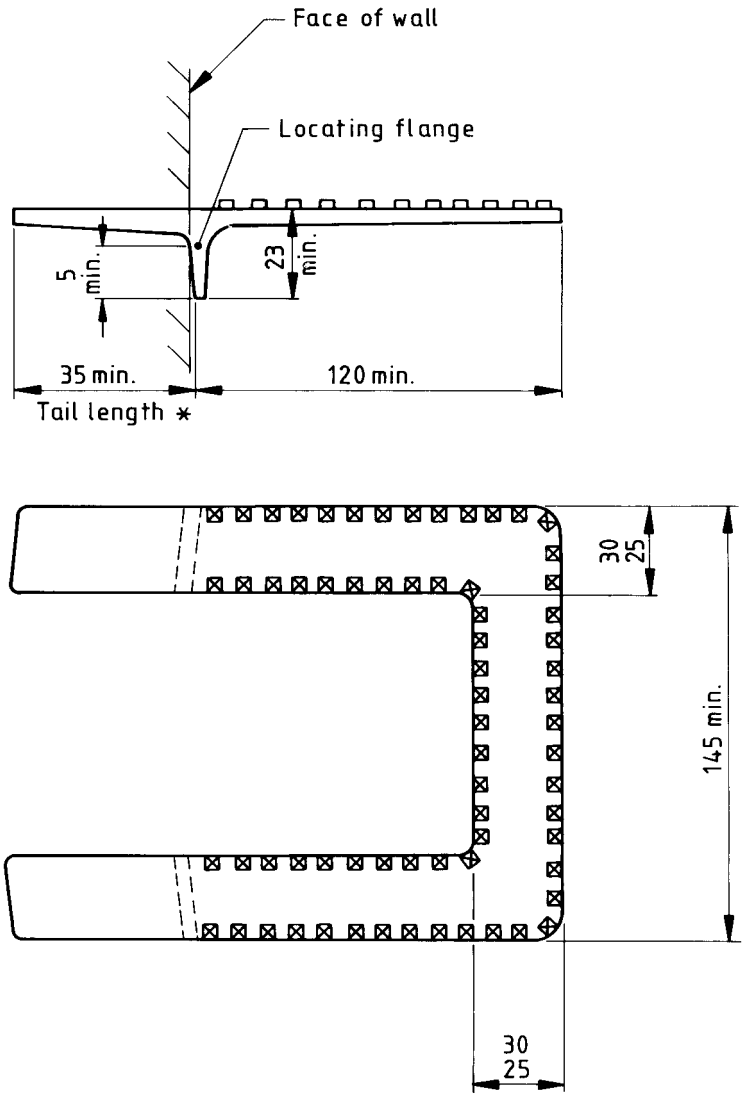
d) material.




*Subject to a permissible deviation of 5 %

All dimensions are in millimetres.

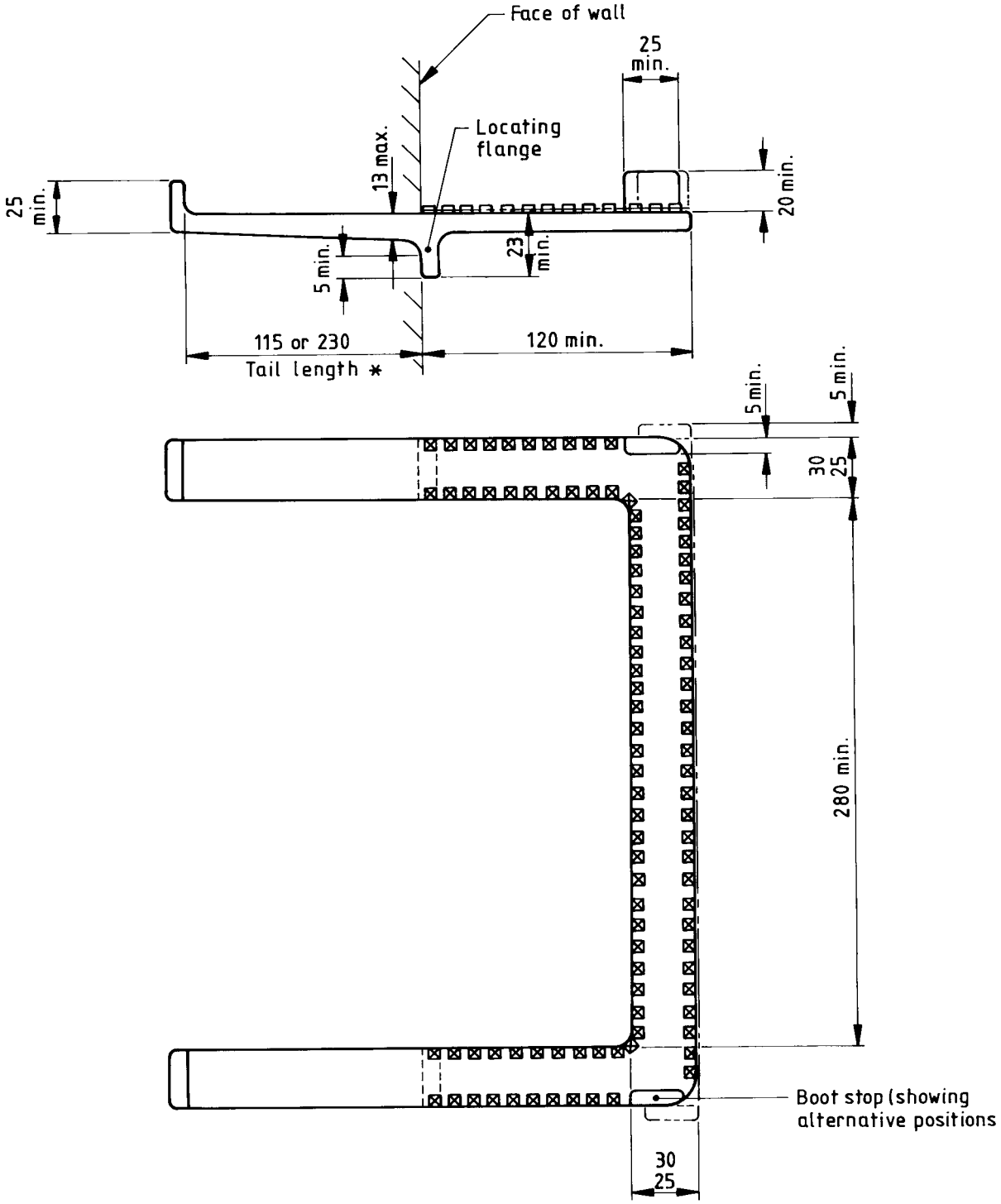
**Figure 1 — Typical general purpose pattern single step**




*Subject to a permissible deviation of 5 %

All dimensions are in millimetres.

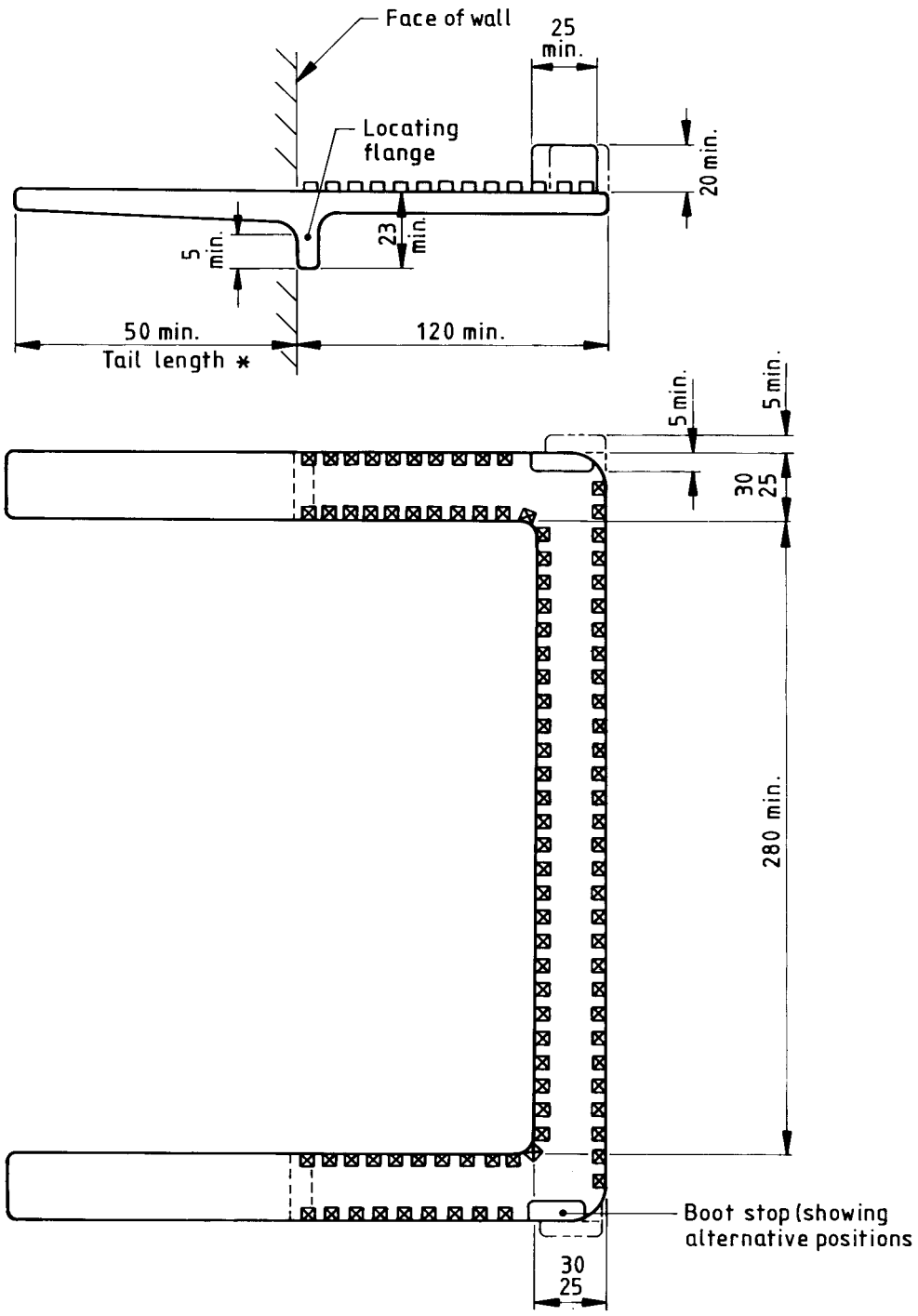
**Figure 2 — Typical precast concrete manhole pattern single step**




*Subject to a permissible deviation of 5 %

All dimensions are in millimetres.

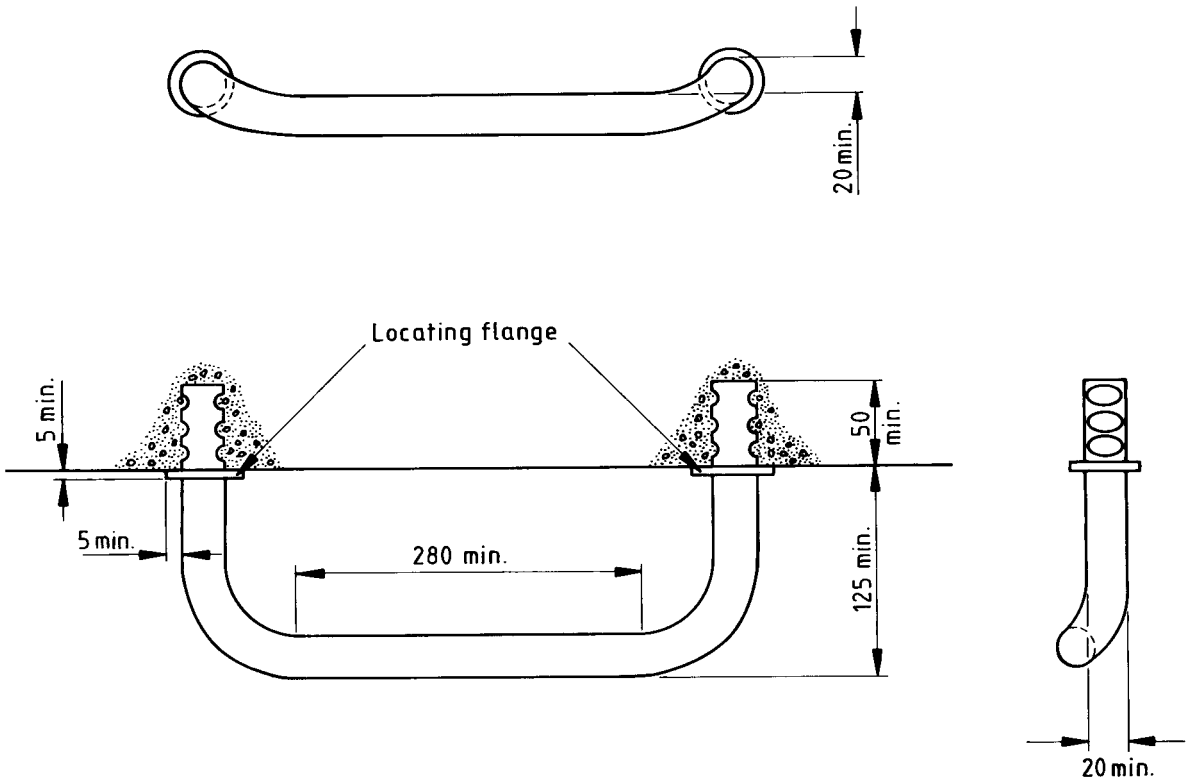
**Figure 3 — Typical general purpose pattern double step**




*Subject to a permissible deviation of 5 %

All dimensions are in millimetres.

**Figure 4 — Typical precast concrete manhole pattern double step**




All dimensions are in millimetres.

**Figure 5 — Typical round bar double step**

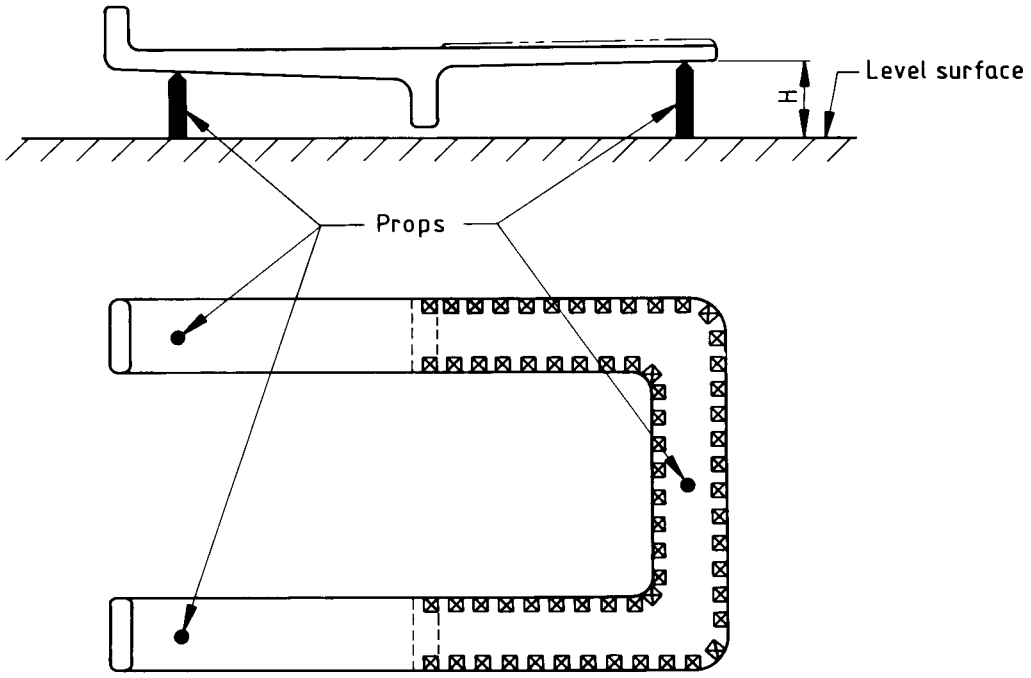



**Figure 6 — Test for twist**

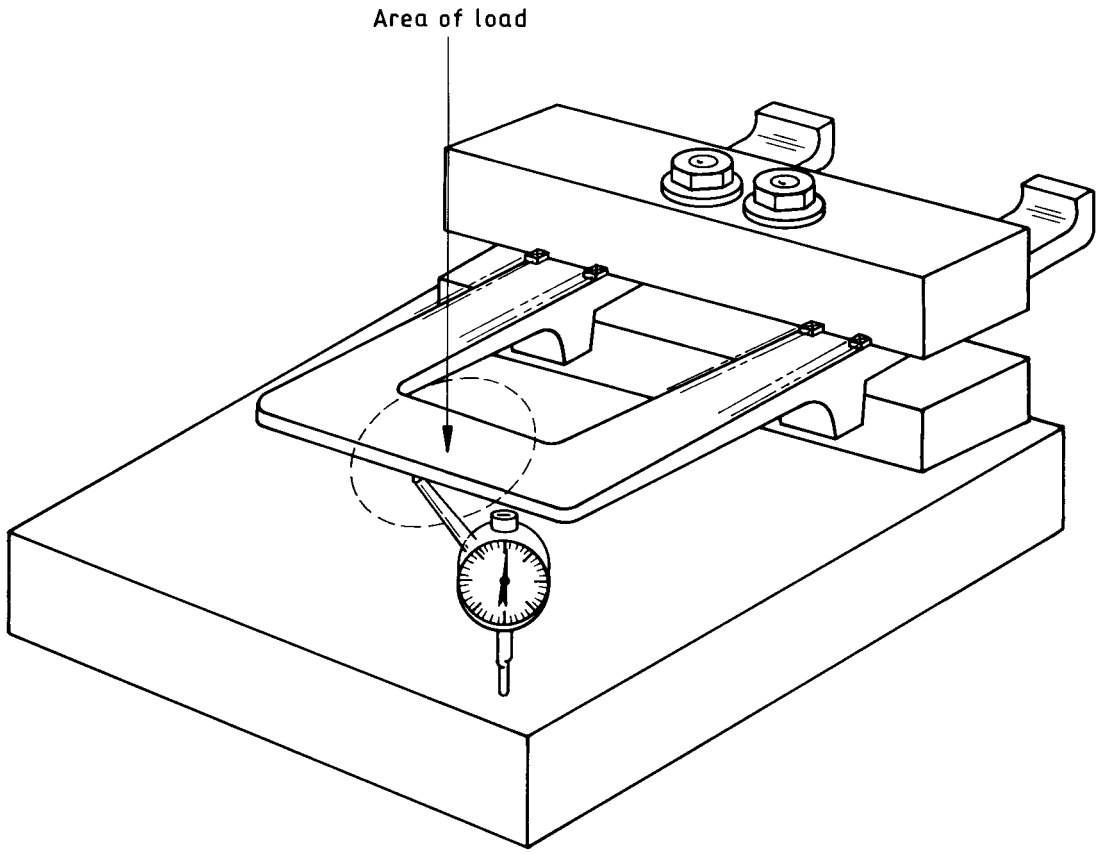



**Figure 7 — Typical apparatus for bending test**

# Publications referred to

BS 729, *Specification for hot dip galvanized coatings on iron and steel articles.*

BS 970, *Specification for wrought steels for mechanical and allied engineering purposes.*

BS 970-1, *General inspection and testing procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels.*

BS 1610, *Materials testing machines and force verification equipment.*

BS 2789, *Specification for spheroidal graphite or nodular graphite cast iron.*

BS 3100, *Specification for steel castings for general engineering purposes.*

BS 4360, *Specification for weldable structural steels.*

BS 4449, *Specification for carbon steel bars for the reinforcement of concrete.*

BS 4550, *Methods of testing cement.*

BS 4550-5, *Standard sand for concrete cubes.*

BS 5781, *Measurement and calibration systems.*

BS 5781-1, *Specification for system requirements.*

BS 5911, *Precast concrete pipes, fittings and ancillary products.*

BS 6681, *Specification for malleable cast iron.*

# 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