

Specification for

**Strength and durability
performance of metal
hinges for side hanging
applications and
dimensional
requirements for
template drilled hinges**

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Elements and Components (of Diverse Materials) for Buildings Standards Policy Committee (ECB/-) to Technical Committee ECB/41, upon which the following bodies were represented:

- Aluminium Window Association
- Association of Builders Hardware Manufacturers
- Association of Burglary Insurance Surveyors
- British Hardware Federation
- British Lock Manufacturers' Association
- British Plastics Federation
- British Woodworking Federation
- Consumer Policy Committee of BSI
- Department of Health
- Department of the Environment (Building Research Establishment)
- Department of the Environment (Property Services Agency)
- Glass and Glazing Federation
- Guild of Architectural Ironmongers
- Incorporated Association of Architects and Surveyors
- Institute of Architectural Ironmongers
- Institute of Carpenters
- Loss Prevention Council
- Royal Institute of British Architects

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

- Steel Hingemakers' Association

This British Standard, having been prepared under the direction of the Elements and Components (of Diverse Materials) for Buildings Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 October 1990

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First published as BS 1227-1 A, May 1945
Second edition, March 1967
Third edition as BS 7352 October 1990

The following BSI references relate to the work on this standard:
Committee reference ECB/41
Draft for comment 89/12615 DC

ISBN 0 580 18857 4

Amendments issued since publication

Amd. No.	Date	Comments

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Foreword

This British Standard has been prepared under the direction of the Elements and Components (of Diverse Materials) for Buildings Standards Policy Committee. It supersedes BS 1227-1A:1967, which is withdrawn.

BS 1227-1A was first published in 1945 and revised in 1967. The standard specified minimum requirements for the materials, workmanship, construction, dimensions and weights of knuckle type hinges made of steel, cast iron, solid drawn (extruded) brass and aluminium, and band type hinges made of steel. It did not include any performance requirements for strength, mechanical endurance or durability of finish.

The dimensional requirements have proved insufficient to ensure complete interchangeability between nominally similar hinges made by different manufacturers. There is an increasing number of applications where door closers are fitted to heavy doors (often fire doors) in public, institutional and commercial buildings, and experience has shown that problems can arise in service if the hinges for such heavy doors are not correctly selected and fitted.

BS 7352 covers nine classes of hinges suitable for side hanging applications ranging from lightweight cupboard doors weighing under 10 kg to leaves weighing up to 120 kg. The standard specifies static strength test requirements and allowable wear during endurance testing for all hinges, and corrosion protection requirements for those hinges which are not intended to be painted after fitting. It specifies the maximum level of frictional resistance generated by hinges, and the maximum initial free movement permitted between components. It also includes dimensional requirements for full mortice template drilled hinges for use on metal doors and frames. These follow American practice, which is widely accepted internationally.

There are special requirements which are not covered by this standard for hinges for some types of windows. Because the performance characteristics of plastics materials are liable to change significantly with age this standard does not cover hinges whose principal components are made from such materials.

Appendices give details of a suitable test rig (Appendix A), test procedures (Appendix B) and guidance on the selection and use of hinges (including hinges for unusually large doors and for fire door applications)(Appendix C).

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 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.

1 Scope

This British Standard specifies static strength testing and allowable wear during endurance testing for all single axis metal hinges for side hanging applications for leaves weighing up to 120 kg and leaf dimensions up to 2 400 mm high by 1 200 mm wide. It also specifies corrosion protection for those metal hinges which are not intended to be painted after fitting. It specifies the maximum permissible torque arising from frictional resistance generated within the hinge during endurance testing, the maximum amount of initial horizontal movement permitted between components for all hinges and the maximum amount of initial vertical movement between components for hinges other than lift off types. It also specifies dimensional and other requirements for full mortice template drilled hinges for metal doors and frames.

The metals used for the principal components of hinges such as leaves, knuckles, barrels and pins may be ferrous or non-ferrous without restriction on the methods of fabrication. The use of plastics materials for such components is excluded, but plastics or other non-metallic materials may be used for ancillary components such as washers, bushes or ferrules, or for the corrosion protection of metal components.

Where compliance with BS 7352 is claimed for turn-tilt window hinges, the test requirements apply to the side hung (turn) mode only. The standard does not specify multiple axis variable geometry friction hinges for windows nor hinges incorporating spring assisted closing mechanisms.

The fastenings used to fix hinges to leaves and to structures are not specified by this standard. Accordingly, hinges under test are bolted to the test rig.

NOTE 1 This standard does not include specific additional requirements for hinges for fire doors but general guidance on fire door applications is given in C.11.

NOTE 2 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

significant surface

any surface which is visible when the hinge is installed and which is essential to the appearance, function or serviceability of the hinge

2.2

full mortice template drilled hinge

a hinge designed for morticing into the butt edge of the door and into the rebate edge of the frame

NOTE These hinges are used generally with steel frames and steel doors.

3 Classification

Hinges are classified according to the maximum mass of the hinged leaf with which they will be used and the maximum annual number of operations as given in Table 1.

Table 1 — Classification of hinges

Class	Maximum mass of hinged leaf	Maximum annual number of operations
	kg	cycles
1	10	5 000
2	20	5 000
3	20	25 000
4	40	25 000
5	40	200 000
6	40	500 000
7	60	500 000
8	80	200 000
9	120	200 000

NOTE These nine classes cover the majority of applications (see C.4 to C.6). The masses are based on the use of three hinges per leaf. If two hinges are used the masses listed should be reduced by one third. (See also C.7.)

4 Tests

4.1 Ambient temperature

The temperature in the laboratory shall be maintained at 20 ± 5 °C throughout the period of testing.

4.2 Static load tests

One hinge of each type shall be subjected to the initial measurement tests described in B.1 and to both of the static load tests described in B.2 in succession.

4.3 Endurance test

One hinge of each type shall be subjected to the test described in B.3.

This hinge shall not previously have been subjected to the static load tests specified in 4.2. It shall be tested as supplied without additional lubrication, except that for endurance tests of 200 000 or 500 000 cycles the hinge shall be lubricated in accordance with B.3.

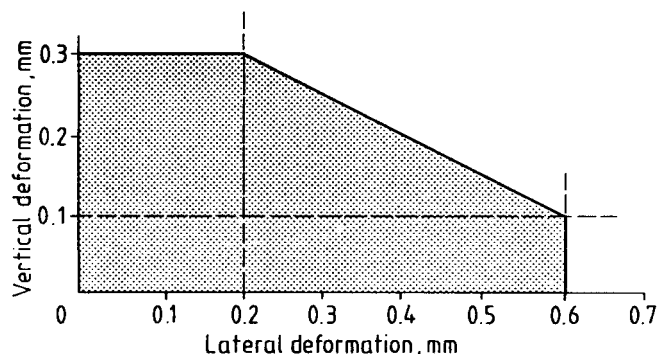


Figure 1 — Limits of allowable deformation in static load tests

4.4 Corrosion test

When applicable, one hinge of each type shall be subjected to the corrosion test specified in clause 6. This hinge shall not previously have been subjected to any other tests.

5 Test loads, numbers of cycles and acceptance criteria

5.1 Initial measurements

When tested in accordance with B.1 the maximum permissible initial horizontal free movement shall be 0.2 mm and the maximum permissible initial vertical free movement shall be 0.4 mm.

5.2 Static load tests

5.2.1 Maximum load

The maximum prescribed load for each class shall be as given in Table 2.

Table 2 — Static load tests

Class	Load-deformation test maximum test load (see note)	Overload test (see note)
	kg	kg
1	20	30
2	40	60
3	40	60
4	80	120
5	80	120
6	80	120
7	120	180
8	160	240
9	240	360

NOTE The test loads have a tolerance of + 0.5, – 0 kg

5.2.2 Acceptance criteria

5.2.2.1 Load-deformation test

When tested in accordance with B.2.1 the hinge shall comply with the following:

- the maximum lateral displacement under load shall be 2 mm;
- the maximum vertical displacement under load shall be 4 mm;
- the lateral and vertical residual displacements after unloading shall be within the shaded area of Figure 1;
- there shall be no visible cracking or breakage of any component.

5.2.2.2 Overload test

When tested in accordance with B.2.2, the hinge shall comply with the following:

- there shall be no breakage of any hinge leaf, knuckle, barrel or pin;
- the test leaf shall remain connected to the frame even though the hinge may have been rendered inoperable.

5.3 Endurance test

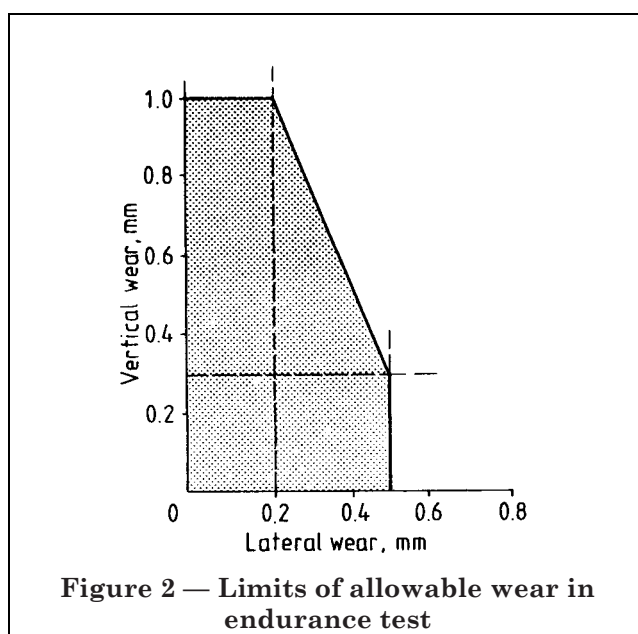
5.3.1 Mass of test leaf and number of cycles

The mass of the test leaf and number of cycles for each class shall be as given in Table 3.

Table 3 — Endurance test

Class	Mass of test leaf (see note 1) kg	Number of cycles (see note 2)
1	10	5 000
2	20	5 000
3	20	25 000
4	40	25 000
5	40	200 000
6	40	500 000
7	60	500 000
8	80	200 000
9	120	200 000

NOTE 1 The masses have a tolerance of + 0.5, – 0 kg.
NOTE 2 The cycles have a tolerance of + 1, – 0 %



5.3.2 Acceptance criteria

5.3.2.1 When tested in accordance with **B.3** the amounts of lateral and vertical wear of the hinge tested measured as displacements of the datum surfaces shall be within the shaded area of Figure 2.

5.3.2.2 When tested in accordance with **B.3**, the maximum permissible frictional torque measured at 4 000 cycles and at the end of the test shall be 2 N m for classes 1 to 6, 3 N m for classes 7 and 8 and 4 N m for class 9.

5.4 Retesting

5.4.1 Static load tests

If the hinge tested fails to comply with any one of the acceptance criteria then a further sample of two hinges shall be subjected to the test in which failure occurred. If both hinges retested then comply with the acceptance criteria, the first failure shall be ignored. If either of the hinges retested fails to comply with all of the acceptance criteria no further retesting shall be allowed.

5.4.2 Endurance test

If the hinge tested fails to comply with the acceptance criteria then a further sample of two hinges shall be subjected to the endurance test. If both hinges then comply with the acceptance criteria the first failure shall be ignored. If either of the hinges retested fails to comply with the acceptance criteria no further retesting shall be allowed.

6 Corrosion protection

NOTE 1 Hinges which are supplied in self colour mill finish for subsequent corrosion protection in situ, e.g. by painting, are not subject to the requirements of this clause.

Hinges shall be subjected to neutral salt spray testing in accordance with BS 5466-1. The hinges shall be examined after each of the exposure periods specified in Table 4 until corrosion of the base metal on significant surfaces is visible to the unaided eye.

NOTE 2 Staining or discoloration of an applied surface treatment is acceptable and should not be confused with corrosion of the base metal.

The corrosion protection classification achieved by the surface treatment shall be stated.

Table 4 — Corrosion protection classification

Classification	Exposure h	Tolerance h
CP 2	2	– 0, + 1/4
CP 6	6	– 0, + 1/2
CP 24	24	– 0, + 1
CP 48	48	– 0, + 2
CP 96	96	– 0, + 4
CP 240	240	– 0, + 4

7 Template drilled hinges

7.1 General

Full mortice template drilled hinges for use on metal doors and frames shall comply with the dimensional and other requirements given in **7.2** to **7.6**.