BRITISH STANDARD

BS 8424:2004

Building hardware — Pull handles — Requirements and test methods

ICS 91.190

Confirmed February 2012

BSI British Standards

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee B/538, Doors, windows, shutters, hardware and curtain walling, to Subcommittee B/538/4, Building hardware, upon which the following bodies were represented:

Association of Building Engineers

Association of Building Hardware Manufacturers

Association of Burglary Insurance Surveyors

British Plastics Federation

British Security Industry Association

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 19 February 2004

Amendments issued since publication

Amd. no.	Date	Comments

The following BSI references relate to the work on this British Standard:
Committee reference B/538/4
Draft for comment 02/100303 DC

ISBN 0 580 43402 8

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Foreword

This British Standard has been prepared under the direction of Subcommittee B/538/4, Building hardware.

This British Standard incorporates the same classification system used in the series of European Standards for building hardware.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Summary of pages
This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 6, an inside back cover and a back cover.

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1 Scope

This British Standard specifies requirements for the performance and testing of door mounted pull handles incorporating one fixing point or more.

It is applicable to pull handles of all types of material and methods of manufacture.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 6100 (all parts), *Glossary of building and civil engineering terms.*

BS EN 1670:1998, *Building hardware — Corrosion resistance — Requirements and test methods.*

BS EN 1634-1, *Fire resistance tests for door and shutter assemblies — Part 1: Fire doors and shutters.*

BS EN 636, *Plywood — Specifications.*

3 Terms and definitions

For the purpose of this British Standard, the terms and definitions given in BS 6100 apply.

4 Classification

NOTE The classification system described in this clause is the same as that specified in the series of European Standards for building hardware.

4.1 General

Pull handles shall be classified in accordance with the six digit classification system described in **4.2** to **4.7**.

4.2 Category of use (first digit)

The category of use for a pull handle shall be classified as either:

— grade 1: light duty [endures a force of 100 N];
— grade 2: medium duty [endures a force of 250 N];
— grade 3: heavy duty [endures a force of 600 N];
— grade 4: severe duty [endures a force of 1 200 N].

4.3 Durability (second digit)

The durability of a pull handle shall be classified as:

— grade 2: 5 000 test cycles.

NOTE In European Standards for building hardware, durability is classified in terms of the number of test cycles the hardware is subjected to. However, the durability test for pull handles keeps the number of test cycles constant, i.e. 5 000 test cycles, and determines durability in terms of the size of a force that the pull handle can endure (see Clause **7**). The size of the force that a pull handle is required to tolerate depends upon the category of use for which it is intended (see **4.2**).

4.4 Door mass (third digit)

No classification.

4.5 Suitability for use on fire/smoke doors (fourth digit)

The suitability for use of the pull handles on fire/smoke door assemblies shall be classified as:

— grade 0: not intended for use on fire/smoke door assemblies;
— grade 1: suitable for use on fire/smoke door assemblies.

NOTE Information about the types of fire/smoke door assemblies for which the pull handle is suitable is to be supplied by the manufacturer in accordance with Clause **9**.

4.6 Safety (fifth digit)

The safety of pull handles shall be classified as:

— grade 1: safe.

4.7 Corrosion resistance (sixth digit)

The corrosion resistance of pull handles shall be classified in accordance with BS EN 1670:1998, Clause **4** as:

— grade 0: no defined corrosion resistance;

— grade 1: low resistance;

— grade 2: moderate resistance;

— grade 3: high resistance;

— grade 4: very high resistance.

4.8 Summary of classification

1	2	3	4	5	6
Category of use	Durability	Door mass	Suitability for use on fire/smoke doors	Safety	Corrosion resistance

4.9 Example of classification

The following example of classification denotes a heavy duty pull handle of grade 2 durability, for an unspecified door mass. It is suitable for use on fire/smoke door assemblies and is classified as safe. The pull handle has a very high corrosion resistance and is therefore suitable for use in a marine or very polluted industrial environment.

3	2	—	1	1	4

5 Safety

All pull handles which satisfy the requirements of this standard shall be classified as safe, i.e. grade 1 (see **4.6**).

All arrisses and exposed corners shall be rounded to a radius of not less than 0.5 mm.

6 Performance

6.1 Durability

Pull handles shall be tested for durability in accordance with Clause **7**. The level of durability to which a pull handle shall be tested depends upon the category of use for which it is intended (see **4.2**).

When tested in accordance with Clause **7**:

a) the pull handle assembly shall not show any sign of damage;

b) the pull handle fixings shall not show any sign of loosening or damage; and

c) any residual deformation of the pull handle, as measured in accordance with **7.3.5**, shall be not greater than 1 mm.

6.2 Corrosion resistance

All pull handles, no matter what material they are made of, shall be tested for corrosion resistance in accordance with BS EN 1670:1998, **5.6** for one of the corrosion resistance grades listed in **4.7**.

All surfaces of the pull handle which are visible when fitted in service shall conform to the acceptance criteria in BS EN 1670:1998, **5.7**.

The BS EN 1670 test shall be carried out on samples that have not already been subjected to any form of testing.

6.3 Fire resistance

In order to be classified as suitable for use on fire/smoke door assemblies, i.e. grade 1 in **4.5**, pull handles shall be incorporated into a door assembly and the whole assembly shall be subjected to a fire test in accordance with BS EN 1634-1.

BS EN 1634-1 allows for the testing of the fire resistance of a number of different types of door assemblies. Therefore, if a pull handle is classified as suitable for use on fire/smoke doors after testing in accordance with BS EN 1634-1, the manufacturer shall supply information in accordance with Clause **9** regarding the types of fire/smoke door assemblies for which the pull handle is suitable.

7 Durability test

7.1 General

Control the ambient temperature of the test environment throughout the test to between 15 °C and 30 °C.

Ensure that the testing environment is draught free.

Apply the following tolerances on measured values, except where otherwise defined:

— angular position, in degrees: ±2°;
— force, in newtons: ±2 %;
— length, in millimetres: ±2 %;
— time, in seconds: ±1 s.

Determine measurements using measuring instruments with an accuracy of ≥ 1.5 %.

Include, as part of the test equipment, a means for recording the number of test cycles performed.

7.2 Apparatus

7.2.1 *Test rig*, comprising the apparatus specified in **7.2.2** and **7.2.3**.

NOTE A typical test rig is shown in Figure 1.

7.2.2 *Mounting block*, with a thickness of (40 ± 1) mm, made of plywood conforming to class F 30/40, E 40/50 of BS EN 636. The plywood shall be made of between 18 and 22 laminations.

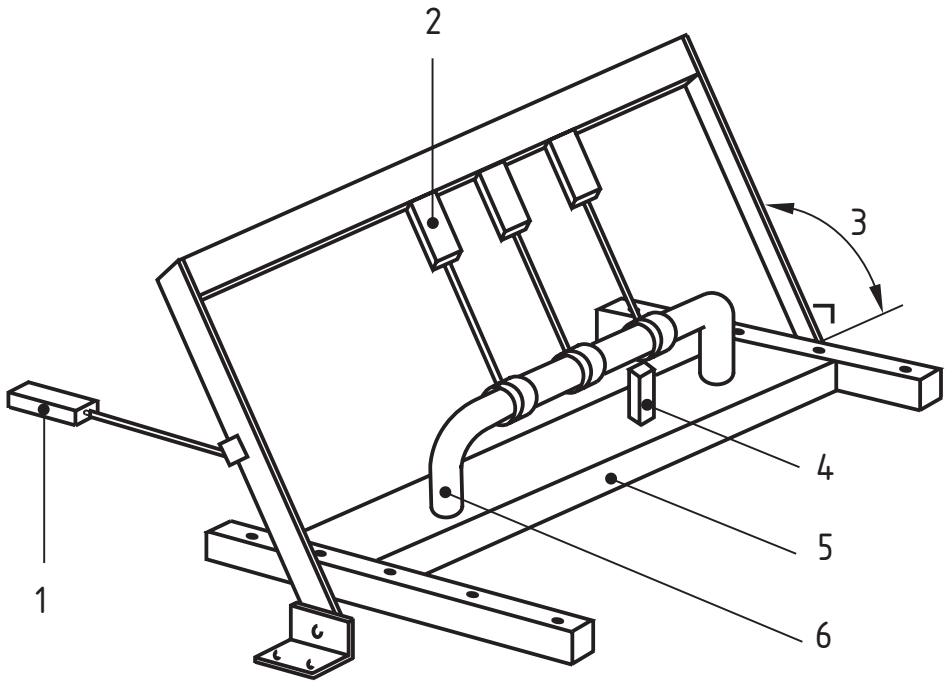
The mounting block shall be of a suitable size to accept the test sample. The block shall extend at least 30 mm beyond the extreme dimensions of the sample in all directions, including any mounting plate or fixture that forms a part of the pull handle assembly.

Where the test sample is particularly long or wide, separate mounting blocks may be used at each pull handle fixing point with the proviso that each block shall extend at least 30 mm beyond the pull handle fixing point, including any mounting plate or fixture that forms a part of the pull handle assembly. Under these conditions each mounting block shall be securely fixed to a common steel plate of sufficient strength and rigidity such that there is no visible distortion of the plate during the tests.

7.2.3 *Ram*, comprising a hydraulic load applicator, or similar loading device, which can exert the test forces required in **4.2**.

Three pull action rams on the test rig shall be connected in such a way that each can be operated independently. The pull action rams shall be capable of operating at 3 s intervals.

An additional angular positioning ram shall be positioned to enable the three pull action rams to be rotated from a 30° position to a 150° position, in increments of 30°.



Key

1. Ram for angular position
2. One of three rams for pull action on handle
3. Arc of rotation from 30° to 150°
4. Failure cut-out switch
5. Mounting block
6. Pull handle under test

Figure 1 — Typical test apparatus

7.3 Procedure

7.3.1 *Preparing the test specimen*

Examine the test specimen to ensure that it is complete and undamaged.

Mount the test specimen on the test rig specified in **7.2** using the fixings with which the manufacturer intends the pull handle to be used.

If the manufacturer is not performing the durability test, the manufacturer shall supply the tester with instructions about how to mount the pull handle onto the test rig, including details about which fixings to use.

NOTE The pull action rams of the test rig are not attached to the test specimen at this stage of the durability test.

7.3.2 *Pre-test measurements*

Measure the gap between the inner face of the pull handle and the face of the test block, at the mid-point of the handle longitudinally.

7.3.3 *Method of force application*

7.3.3.1 *General*

Select the force that a pull action ram exerts on the test specimen from one of the categories listed in **4.2**.

Connect the pull action ram(s) to the test specimen and subject the test specimen to the force in accordance with **7.3.3.2** or **7.3.3.3**, whichever is applicable.

7.3.3.2 *Method of test for pull handles <200 mm in length*

Connect the middle pull action ram to the centre of the pull handle test specimen.

When it is not possible to connect the middle pull action ram to the centre of the pull handle, e.g. for pull handles with one central fixing point, connect the middle pull action ram to either side of the fixing point in such a way that the load applied by the ram is evenly distributed and avoids excess stress. In such cases, record the precise position of the middle pull action ram.

Subject the test specimen to the following cycle of force application.

a) Index the angular positioning ram to the 30º position and apply a force without shock according to the required category of use grade shown in **4.2**. Maintain the force for 3 s.

b) Index the angular positioning ram to the 60º, 90º, 120º and 150º positions, applying the same force used in item a) without shock at each position. Maintain the force in each position for 3 s.

NOTE The two outer pull action rams are not connected to the test specimen.

Repeat the a) and b) test cycle 5 000 times.

7.3.3.3 *Method of test for pull handles >200 mm in length*

Connect the three pull action rams to the pull handle and ensure that the two outer pull action rams are positioned 50 mm from each end, and the remaining pull action ram is centrally positioned on the handle.

When it is not possible to connect the two outer pull action rams 50 mm from each end of the pull handle, e.g. for cranked pull handles, ensure that the two outer pull action rams are connected to the next nearest practicable position. In such cases, record the precise position of the outer two pull action rams.

When it is not possible to connect the middle pull action ram to the centre of the pull handle, e.g. for pull handles with one central fixing point, connect the middle pull action ram to either side of the fixing point in such a way that the load applied by the ram is evenly distributed and avoids excess stress. In such cases, record the precise position of the middle pull action ram.

Subject the test specimen to the following cycle of force application.

a) Index the angular positioning ram to the 30º position and apply a force without shock according to the required category of use grade shown in **4.2**, each of the three pull action rams applying the force in sequence. Maintain the force from each pull action ram for 3 s.

b) Index the angular positioning ram to the 60º, 90º, 120º and 150º positions and, at each index position, apply the same force used in item a) without shock from each ram in sequence. Maintain the force from each pull action ram for 3 s for each position.

Repeat the a) and b) test cycle 5 000 times.

7.3.4 *Post-test measurement*

Measure the gap between the inner face of the pull handle and the face of the test block, at the mid-point of the handle longitudinally, using the same method as in **7.3.2**.

If the test block has suffered damage during the durability test, place the pull handle on a flat reference surface to enable accurate measurement of the gap.

7.3.5 *Calculation of results*

Determine the extent of deformation caused on the pull handle after testing in accordance with **7.3.3** by calculating the difference between the values determined in **7.3.2** and **7.3.4**.

7.3.6 *Post-test assessment*

Verify whether the performance of the pull handle conforms to **6.1** for the category of use specified in **4.2** for which it was tested.

7.4 Test report

The report shall contain the following information:

a) the name of the pull handle manufacturer;

b) a detailed description of the pull handle and its fixings;

c) the date of testing and the standard to which it has been tested, i.e. BS 8424:2004;

d) the force applied in accordance with **4.2**;

e) whether the test was carried out in accordance with **7.3.3.2** or **7.3.3.3**;

f) a record of the precise position and method of attachment of the pull action rams to the pull handle during force application in accordance with **7.3.3**;

g) extent of deformation, calculated in accordance with **7.3.5**;

h) whether the pull handle has passed or failed the test in accordance with **6.1**.

8 Marking

The product, or optionally its literature and packaging, shall be marked with the following[1)]:

a) manufacturer's name or trademark or other means of positive identification;

b) manufacturer's product model identification;

c) classification in accordance with Clause **4**;

d) number and date of this British Standard, i.e. BS 8424:2004;

e) year and week of manufacture.

NOTE The year and week of manufacture may be presented in code form, e.g. week 36 of year 2004 may be expressed as 0436.

9 Information and items to be supplied by the manufacturer

Pull handles shall be supplied with the fixings with which they are intended to be used.

The pull handles shall be supplied with clear and detailed instructions for their installation and maintenance.

If a pull handle is classified as suitable for use on fire/smoke doors after testing in accordance with **6.3**, the manufacturer shall supply information about the types of fire/smoke door assemblies for which the pull handle is suitable.

[1)] Marking BS 8424:2004 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 solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

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