BRITISH STANDARD

BS EN
15570:2008

Hardware for furniture — Strength and durability of hinges and their components — Hinges pivoting on a vertical axis

ICS 91.190

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 15570:2008.

The UK participation in its preparation was entrusted by Technical Committee FW/0, Furniture, to Subcommittee FW/0/1, Common test methods.

A list of organizations represented on this committee can be obtained on request to its secretary.

UK committee FW/0/1 would like to draw the attention of users to the fact that storage furniture fitted with hardware that satisfies the requirements of this standard will not automatically satisfy the requirements of standards specifying requirements for the safety, strength and durability of moving parts of storage furniture. These currently include: EN 14074, EN 14727, EN 14749, ISO 7170, BS 6222-2 and BS 4875-7.

Therefore, it is the opinion of the UK committee that EN 15570 should be used as a guide to the selection of hardware and that there is no real benefit in specifying EN 15570 in addition to a finished product standard.

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

Compliance with a British Standard cannot confer immunity from legal obligations.

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Möbelbeschläge - Festigkeit und Dauerhaltbarkeit von Scharnieren und deren Komponenten - Scharniere mit vertikaler Drehachse

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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 15570:2008) has been prepared by Technical Committee CEN/TC 207 “Furniture”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2008, and conflicting national standards shall be withdrawn at the latest by November 2008.

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Introduction

The aim of this European Standard is to provide furniture manufacturers, designers and developers with comparable information regarding the performance of all types of hinges pivoting on a vertical axis and their components.

1 Scope

This European Standard specifies test methods and requirements for the strength and durability of all types of hinges pivoting on a vertical axis and their components for all fields of application.

The tests consist of the application of loads, forces and velocities simulating normal functional use, as well as misuse, that might reasonably be expected to occur.

With the exception of the corrosion test in Clause 6.4, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes.

The strength and durability tests only relate to the hinges and the parts used for the attachment, e.g. mounting plates and screws.

The strength and durability tests are carried out in a test frame with specified properties. The test results can only be used as a guide to the performance of a piece of furniture.

The test results are only valid for the hinges tested. These results may be used to represent the performance of production models provided that the tested model is representative of the production model.

With the exception of corrosion, ageing and the influence of heat and humidity are not included.

Annex A (normative): Requirements for product information.

Annex B (normative): Loads and cycles.

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.

EN 320:1993, *Fibreboards - Determination of resistance to axial withdrawal of screws*

EN 323:1993, *Wood-based panels - Determination of density*

EN ISO 6270-2*, Paints and varnishes - Determination of resistance to humidity - Part 2: Procedure for exposing test specimens in condensation-water atmospheres (ISO 6270-2:2005)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
catch device
device that keeps or pulls a door in place, but does not require a second action in order to release it, e.g. a magnetic catch or a self-closing or self-opening mechanism

3.2
damper
mechanism which stops the movement of a door gently

4 General test conditions

4.1 Preliminary preparation

The hinges shall be assembled/mounted/adjusted according to the instructions supplied with it.

If mounting, assembly or adjustment instructions are not supplied, the most adverse configuration shall be used and the mounting or assembly method shall be recorded in the test report. Fittings shall be tightened before testing and shall not be re-tightened unless specifically required in the manufacturer's instructions. If the configuration must be changed to produce the worst-case conditions, this shall be recorded in the test report.

The tests shall be carried out in indoor ambient conditions at a temperature between 15 °C and 25 °C. If during a test the temperature is outside of the range of 15 °C to 25 °C, the maximum and/or minimum temperature shall be recorded in the test report.

Hinges which include structural hardware parts made of hygroscopic plastic materials, e.g. polyamide, shall be conditioned at (23 ± 5) °C and at a relative humidity of (50 ± 5) % for 7 days before testing.

NOTE For accelerating the conditioning process, EN ISO 1110:1997 [1] may be used.

In the case of designs not addressed in the test procedures, the tests shall be carried out as far as possible as described, and deviations from the test procedure recorded in the test report.

Before beginning testing, visually inspect the hinges and components thoroughly. Record any defects to eliminate any assumption that they have been caused by the tests. Carry out measurements if specified.

4.2 Test equipment

Unless otherwise specified, the tests may be applied by any suitable device because results are not dependent upon the apparatus.

The equipment shall not inhibit deflection of the test door, i.e. it shall be able to move so that it will allow the deflection of the test door during testing.

4.3 Application of forces

The forces in the static load tests shall be applied sufficiently slowly to ensure that negligible dynamic force is applied. Unless otherwise specified, each force shall be maintained for not less than 10 s and not more than 15 s.

The forces in durability tests shall be applied at a rate to ensure that excessive heating does not occur.

The forces may be replaced by masses. The relation 10 N = 1 kg shall be used for this purpose.

4.4 Tolerances

Unless otherwise stated, the following tolerances are applicable:

Forces: ± 5 % of the nominal force;

Velocities: ± 5 % of the nominal velocity;

Masses: ± 1 % of the nominal mass;

Dimensions: ± 1 mm of the nominal dimension;

Angles: $\pm 2^{o}$ of the nominal angle.

The accuracy for the positioning of forces shall be $\pm$ 5 mm.

4.5 Sequence of testing

The tests shall be carried out in the same sequence as the clauses are numbered in this standard. If the clause sequence is not followed, the sequence shall be recorded in the test report.

4.6 Inspection and assessment of results

Before and after the completion of each test, carry out the inspection as specified, after using adjustment devices, if available.

Record any changes that have taken place since the initial inspection.

The inspection shall include at least the following:

a) fracture of any component or joint;

b) loosening of any joint intended to be rigid, which can be demonstrated by hand pressure;

c) deformation or wear of any part or component such that its functioning is impaired;

d) loosening of any means of fixing components;

e) any impaired function of a component or part.

5 Test apparatus

5.1 Masses

Masses shall be designed so that they do not reinforce the structure or re-distribute the stresses.

5.2 Test frame

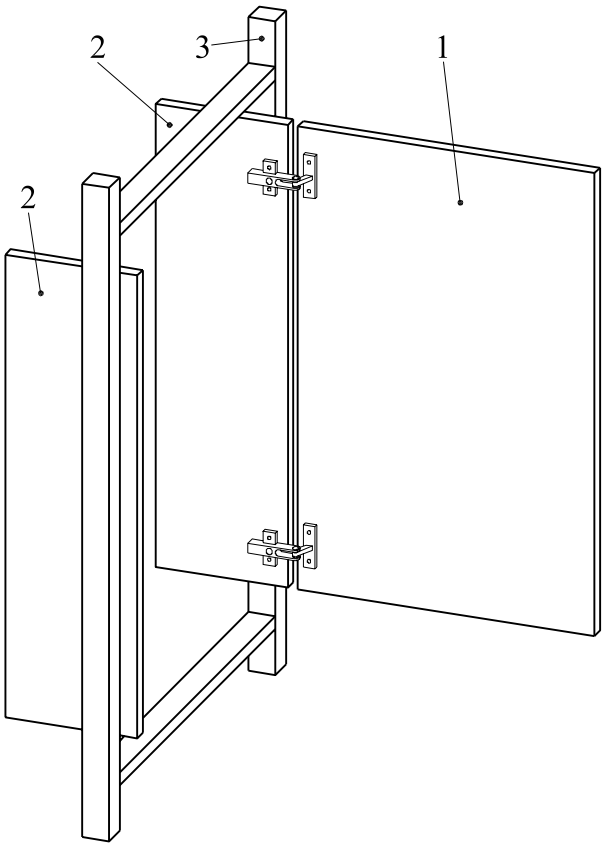
The tests specified in 6.2 and 6.3 shall be carried out in a test frame (see Figure 1), which is so constructed that the deformation under the applied loads is no more than 1 mm.

Hinges for wooden doors shall be mounted on particle board, 5.3, unless otherwise specified.

Hinges for other materials, e.g. glass, metal or plastic shall be mounted according to the manufacturer's instructions.

The position of hinges and components on the door and the test frame as well as the size and weight of the door shall be as specified by the manufacturer, see Annex A.

In cases where the door parameters (e.g. height, width, mass) are not specified by the manufacturer, the tests may be carried out using the standard door sizes specified in Annex B.



Key

1 test door

2 test sides

3 test frame

Figure 1 — Test frame and test door

5.3 Particle board properties

The properties of the particle board shall be as specified in Table 1.

Table 1 — Particle board properties

Property	Reference standard	Requirement
Axial withdrawal of screws	EN 320:1993	1 100 $\pm$ 100 N
Density	EN 323:1993	0,65 $\pm$ 0,05 g/cm^3

6 Test procedures and requirements

6.1 General

For the following tests, three sets of hinges shall be used as follows:

The first set shall be used for the first test sequence specified in 6.2.

The second set shall be used for the second test sequence specified in 6.3.

The third set shall be used for the corrosion test specified in 6.4.

All overload and functional tests shall be carried out according to the same column (1, 2 or 3) in Annex B (normative).

6.2 Overload tests

6.2.1 Vertical static overload

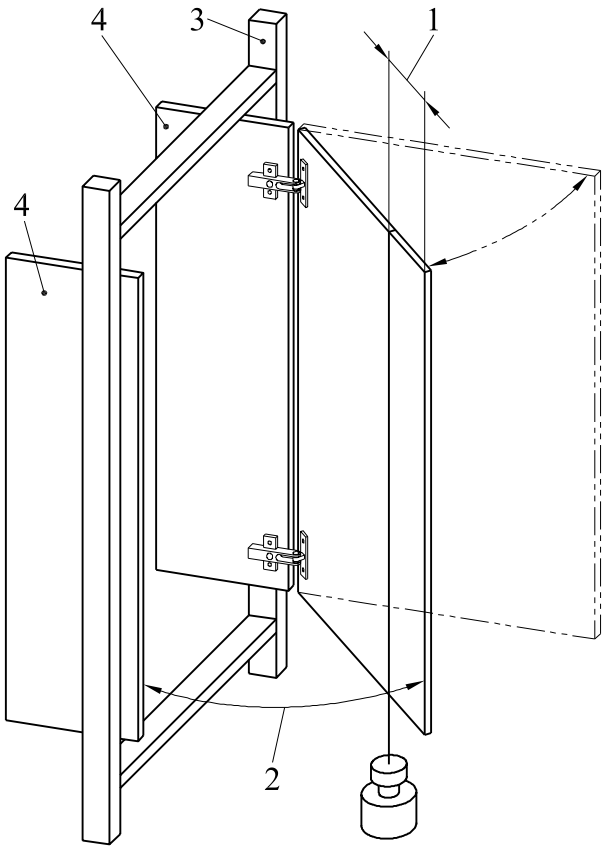
Load the door as shown in Figure 2 with the mass specified in Annex B. The mass shall be suspended 100 mm from the edge furthest from the hinge.

Open and close the door 10 full cycles (back and forth) from a position 45° from fully closed to a position 10° from fully opened, up to a maximum of 135° from the fully closed position.

Opening and closing can be done by hand using 3 s to 5 s for opening and 3 s to 5 s for closing.

Carry out inspection and assessment according to 4.6 without the test load.

The door and/or hinges shall not become detached.



Key

1 100 mm
2 45°
3 test frame
4 test sides

Figure 2 — Vertical static overload

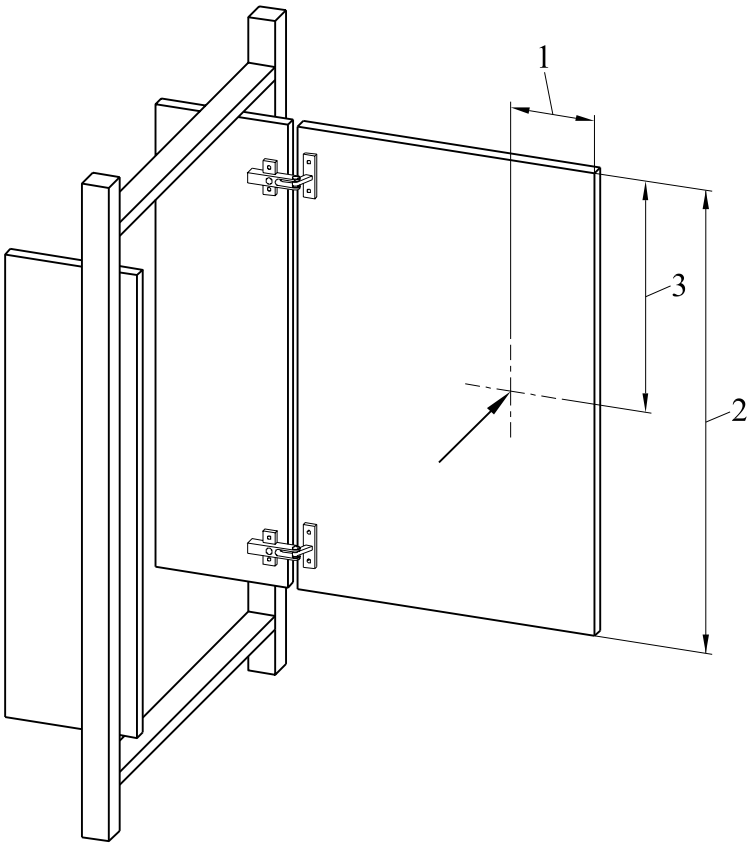
6.2.2 Horizontal static overload

This test applies only to hinges with an opening angle < 135°.

Apply the horizontal static load specified in Annex B 10 times perpendicular to the plane of the door on its horizontal centreline 100 mm from the edge furthest from the hinge, as shown in Figure 3.

Carry out inspection and assessment according to 4.6 without the test load.

The door, hinges or their components shall not become detached.



Key

1 100 mm
2 door height
3 half door height

Figure 3 — Horizontal static overload

6.3 Functional tests

6.3.1 General

During testing according to 6.3, the test door shall be loaded according to Annex A and Annex B.

6.3.2 Operating forces

6.3.2.1 General

The operating forces shall be measured before and after the durability test. The measurements of operating forces shall be made with the door unloaded.

6.3.2.2 Closing force, hinges with self-closing mechanisms

The closing force of hinges with self closing mechanisms shall be measured as shown in Figure 4.

Before measuring the closing force F_o, the door shall be fully opened 10 times by hand.

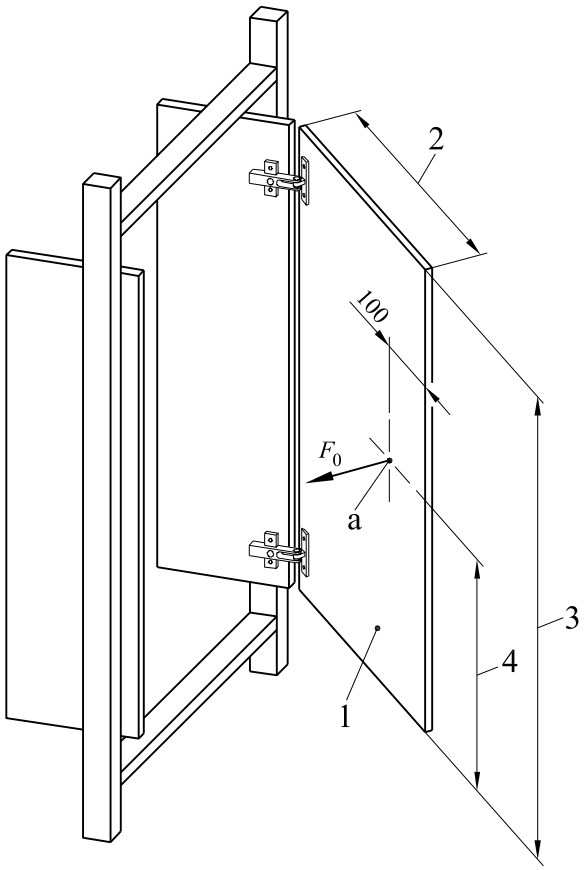
The door shall be moved slowly towards the closed position. The static closing force shall be measured at a position 0,5 mm before the fully closed position.

NOTE The closing speed may have an influence on the measured closing force. It is suggested to keep it as slow as possible, approximately 1 mm/s. In case of damper mechanisms, it may be necessary to reduce the closing speed to obtain the maximum self closing force.

During the measurement, the opening and closing forces shall be applied perpendicular to the front.

The closing force of hinges with self closing spring mechanism shall not be less than 0,5 N before and after the durability test.

Dimensions in millimetres



Key

1 test door (see Figure 1)
2 door width
3 door height
4 half door height
a measuring point

Figure 4 — Measuring the closing force F_o

6.3.2.3 Opening and closing forces

The opening and closing forces, F, shall be measured at the measuring point, see Figure 4, through the full opening angle using a constant and slow opening/closing speed.

The opening and closing forces shall be determined at the beginning of the durability test.

NOTE In case of damper mechanisms, it may be necessary to reduce the opening/closing speed to obtain the forces.

The forces shall not be more than 20 N before and after the durability test.

6.3.3 1st vertical static load test

Load the door as shown in Figure 2 with the mass specified in Annex B. The mass shall be suspended 100 mm from the edge furthest from the hinge.

Open and close the door 10 full cycles (back and forth) from a position 45° from fully closed to a position 10° from fully opened, up to a maximum of 135° from the fully closed position.

Opening and closing can be done by hand using 3 s to 5 s for opening and 3 s to 5 s for closing.

Carry out inspection and assessment according to 4.6 without the test load.

After the test, the hinges and their components shall fulfil their functions.

6.3.4 1st horizontal static load

This test applies only to hinges with an opening angle < 135°.

Apply the horizontal static load specified in Annex B 10 times perpendicular to the plane of the door on its horizontal centreline 100 mm from the edge furthest from the hinge, as shown in Figure 3.

Carry out inspection and assessment according to 4.6 without the test load.

After the test, the hinges and their components shall fulfil their functions.

6.3.5 Slam shut

The door shall be closed by means of a string or cord attached to the back of the door.

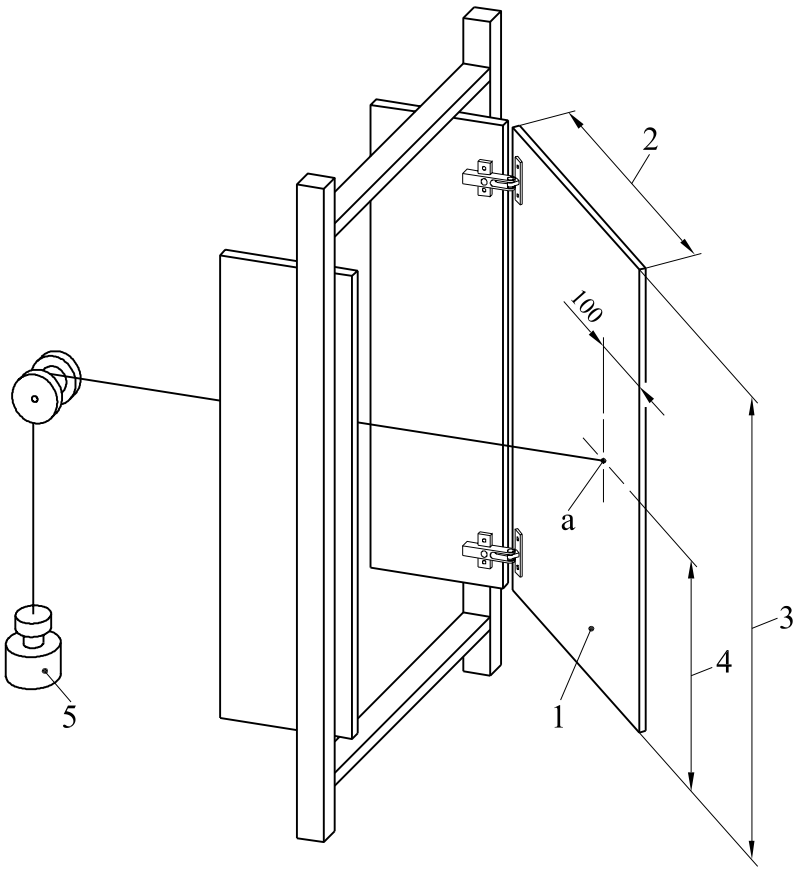
The cord shall act at the point a, see Figure 5, perpendicular to the face of the door, when it is fully closed and shall not change direction by an angle greater than 10° during movement.

Determine the mass, m_1, required to just move the door. The test mass from Annex B shall be the mass, m_2.

Slam closed all doors 10 times using the masses (m_1 + m_2).

Additionally, slam closed doors with dampers 100 times using the masses (m_1 + m_3). If the minimum mass of m_3 does not cause the slam to override the damper function, increase the value of m_3 in steps of 100 g until this happens, however, not more than to the maximum mass of m_3 specified in Annex B.

Dimensions in millimetres



Key

1 test door (see Figure 1)
2 door width
3 door height
4 half door height
5 masses $m_1 + m_2$

Figure 5 — Slam shut at point a

The test mass shall act until 10 mm before the door is fully closed. The mass shall fall through a distance of 300 mm or the distance required to close the door through 30°, whichever is the smaller. The test shall be carried out as shown in Figure 5.

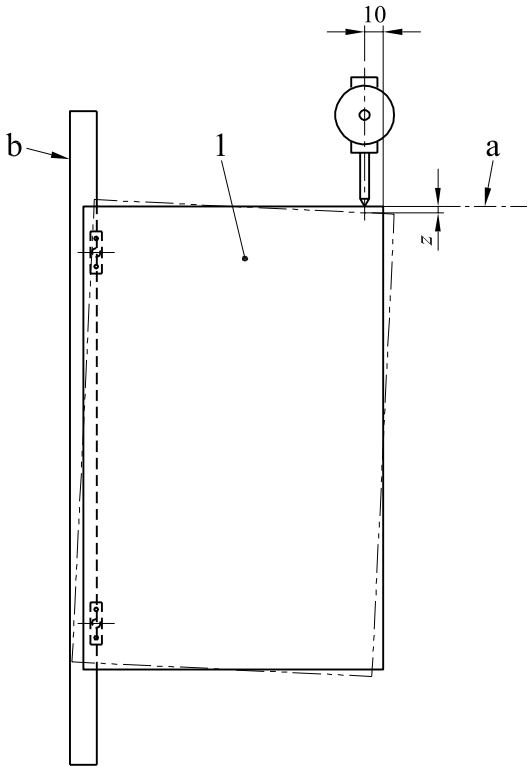
Carry out inspection and assessment according to 4.6.

After the test, the hinges and their components shall fulfil their functions.

6.3.6 Determination of reference point for the door sagging

The reference point shall be determined on the closed test door before the durability test 6.3.7 (see Figure 6).

Dimensions in millimetres



Key

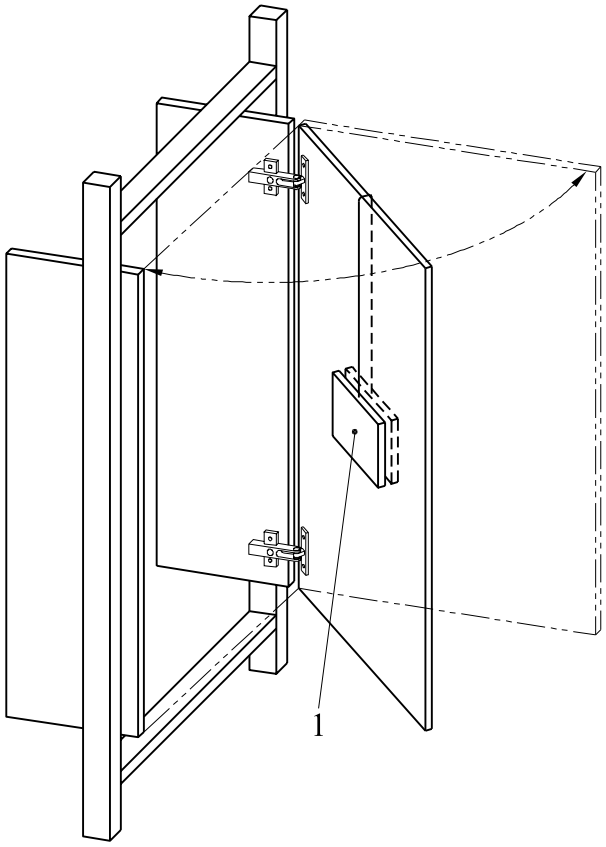
1 test door
a reference edge
b test side panel
z door sagging

Figure 6 — Measuring the door sagging

6.3.7 Durability

Attach two masses, 1 kg each, one on each side of the door at the middle of the vertical centreline (see Figure 7).

Fully open the door to a maximum of 130° and fully close it for the number of cycles (back and forth) according to Annex A and Annex B, without forcing built-in stops in the open position.



Key

1 1 kg masses

Figure 7 — Durability test of pivoted doors

The door shall be gently opened and closed at each cycle without forcing dampers and/or catch devices including self-opening and self-closing mechanisms. Approximately 3 s shall be used for opening and 3 s for closing the door. If the hinges have dampers and/or catch devices, including self-opening and self-closing mechanisms, these shall be allowed to operate correctly according to their function at each cycle.

NOTE The recommended rate is a maximum of 6 cycles per minute with the pause in the closed position. When dampers start to function, the angular velocity should be (45 ± 20)°/s.

Carry out inspection and assessment according to 4.6.

After the test, the hinges and their components shall fulfil their functions.

6.3.8 Deflection (sagging) test

After the durability test and after removing the two 1 kg masses, the sagging (z in Figure 6) shall be determined before and after using adjustment systems. The accuracy of the measurement shall be ± 0,1 mm.

The sagging before using adjustment systems shall not exceed 0,5 % of the width of the door.

6.3.9 2nd vertical static load

Load the door as shown in Figure 2 with the mass specified in Annex B. The mass shall be suspended 100 mm from the edge furthest from the hinge.

Open and close the door 10 full cycles (back and forth) from a position 45° from fully closed to a position 10° from fully opened, up to a maximum of 135° from the fully closed position.

Opening and closing can be done by hand using 3 s to 5 s for opening and 3 s to 5 s for closing.

Carry out inspection and assessment according to 4.6 without the test load.

After the test, the hinges and their components shall fulfil their functions.

6.3.10 2nd horizontal static load

This test applies only to hinges with an opening angle < 135°.

Apply the horizontal static load specified in Annex B 10 times perpendicular to the plane of the door on its horizontal centreline 100 mm from the edge furthest from the hinge, as shown in Figure 3.

Carry out inspection and assessment according to 4.6 without the test load.

After the test, the hinges and their components shall fulfil their functions.

6.4 Corrosion resistance

The corrosion test shall be carried out when required on the third set of hinges according to EN ISO 6270-2.

Requirement: 3 cycles AHT.

With the exception of cutting edges, screw slots, rivet heads, aluminium and moulded parts of zinc, all parts which are visible when the hinges are mounted shall show no corrosion. The function shall be maintained.

If the corrosion test has not been carried out, information on this shall be included in the product information (Annex A).

7 Test report

The test report shall include at least the following information:

a) reference to this European Standard and the applied requirement document;

b) description of the hinges tested and the test door parameters;

c) any defects observed before testing;

d) test results according to the subclauses 6.2.1 to 6.4;

e) details to be included in the product information (Annex A);

f) load and test rate used for the durability test;

g) details of any deviations from this European Standard;

h) name and address of the test facility;

i) date(s) of test.

Annex A
(normative)

Product information system

A.1 General

The aim of the product information is to assist furniture manufacturers/developers in choosing the correct hinge for a given purpose. Therefore, information shall be given by the manufacturer of the hinges on at least the properties specified in this Annex.

A.2 Field of application

The product information shall include information regarding the material(s) for which the hinge(s) are suitable, e.g. solid wood, particle board, glass.

Information regarding the test results shall be included in the product information (Annex B, column 1, 2 or 3).

A.3 The mass and size of the door

The product information shall include information regarding the mass (m) in kg, the size of the door and any additional mass as well as the number of hinges for which the hinge(s) will fulfil the requirements of this standard.

A.4 Adjustment systems and spring and damper mechanisms

The product information shall include information regarding the presence of adjustment systems and spring and damper mechanisms.

A.5 Corrosion test

The product information shall include information on whether the corrosion test has been carried out and whether the requirement has been fulfilled.

Annex B
(normative)

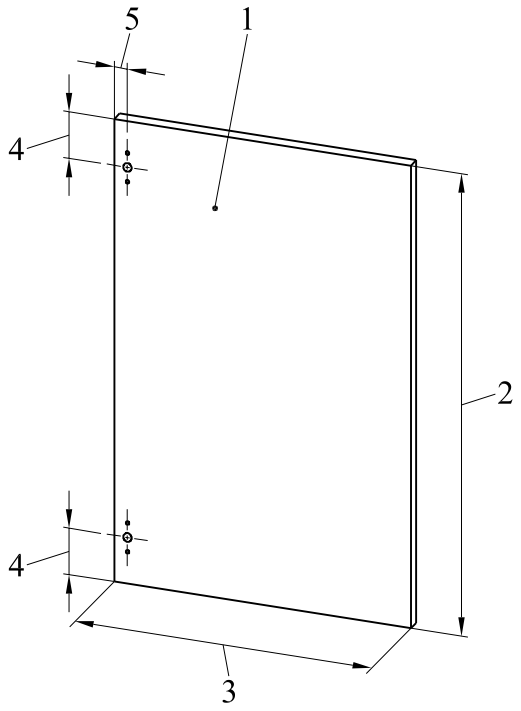
Test parameters

The test parameters shown in Table B.2 and Table B.3, column 1, 2 and 3 are considered suitable for hinges for most fields of application from domestic to contract use.

Table B.1 — Standard door dimensions and masses

Door	Test door parameters (see 5.2)				
Type, material	Height mm	Width mm	Thickness mm	Distance from top to bottom edges mm	Mass kg
A, Particle board	500	400	19	60	—
B, Particle board	700	600	19	60	—
C, Particle board	1 600	600	19	60	—
D, Glass [a]	500	400	—	60	2,7

[a] Glass may be replaced by aluminium or other material.



Key

1 test door

2 door height

3 door width

4 distance from top and bottom edges

5 mounting distance from rear edge

Figure B.1 — Test door dimensions

Table B.2 – Overload tests

Clause / Test	Unit	Loads		
		1	2	3
6.2.1 Vertical static overload	kg	-	20	30
6.2.2 Horizontal static overload	N	-	60	80

Table B.3 – Functional tests

Clause / Test	Unit	Loads and cycles		
		1	2	3
6.3.3 and 6.3.9 Vertical static load	kg	10	15	20
6.3.4 and 6.3.10 Horizontal static load	N	25	30	40
6.3.5 Slam shut (m_2)	kg	2	3	4
6.3.5 Additional slam shut for doors with dampers (m_3)	kg	min. 1, max. 2	min. 1, max. 2	min. 1, max. 2
6.3.7 Durability	cycles	20 000	40 000	80 000

Bibliography

[1] EN ISO 1110:1997, Plastics - Polyamides - Accelerated conditioning of test specimens (ISO 1110:1995)

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