BS EN 15828:2010

BSI Standards Publication

Hardware for furniture — Strength and durability of hinges and their components — Stays and hinges pivoting on a horizontal axis

National foreword

This British Standard is the UK implementation of EN 15828:2010.

The UK participation in its preparation was entrusted to Technical Committee FW/0/1, Common Test Methods for Furniture.

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

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

ISBN 978 0 580 62802 3

ICS 97.140

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2010.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15828

October 2010

ICS 97.140

English Version

Hardware for furniture - Strength and durability of hinges and their components - Stays and hinges pivoting on a horizontal axis

Quincaillerie d'ameublement - Résistance mécanique et endurance des charnières et de leurs composants - Compas et charnières pivotant sur un axe horizontal

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

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 15828:2010: E

Contents

Page

Foreword

This document (EN 15828:2010) 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of an identical text or by endorsement, at the latest by April 2011, and conflicting national standards shall be withdrawn at the latest by April 2011.

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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 and their components.

1 Scope

This European Standard specifies test methods and requirements for the strength and durability of all hinges, stays and systems which include hinges and stays pivoting on a horizontal axis and their components for all fields of application.

It does not apply to systems intended for storage functions.

This standard does not apply to electrically actuated systems.

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 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, *Fibreboards — Determination of resistance to axial withdrawal of screws*

EN 323, *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 which keeps or pulls a flap 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
top hinged flap
flap which opens upwards and which consists of one or more parts

3.3
bottom hinged flap
flap which opens downwards and which consists of one or more parts

3.4
damper
mechanism which stops the movement of a flap gently

3.5
stay
active or passive mechanism which can hold and guide a front, and which may include a braking/opening mechanism and/or a hinge

3.6
flap hinges
active or passive mechanism which can hold and guide a front, and which may include a braking/opening mechanism and/or a stay

4 General test conditions

4.1 Preliminary preparation

The hinges/stays 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 is to 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 a relative humidity of (50 ± 5) % for seven days before testing.

NOTE For accelerating the conditioning process, EN ISO 1110 [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 the testing, visually inspect the hinges and components thoroughly. Record any defects so that they are not assumed to 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 flap, i.e. it shall be able to move so that it will allow the deflection of the test flap 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: ± 2° of the nominal angle.

The accuracy for the positioning of forces shall be ± 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 completion of each test, carry out the inspection as specified, after removing any loads and 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) the fracture of any component or joint;

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

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

d) the 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

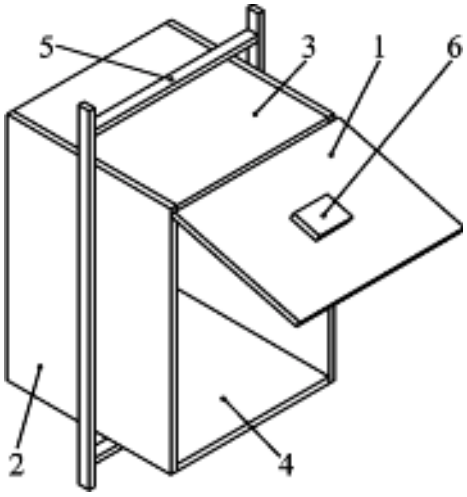
The tests specified in 6.2 and 6.3 shall be carried out in a test frame (see Figures 1 and 2), which is so constructed that the deformation of the test frame under the applied load is no more than 1 mm.

Hinges and stays for wooden flaps shall be mounted on particle board, 5.3, unless otherwise specified.

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

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

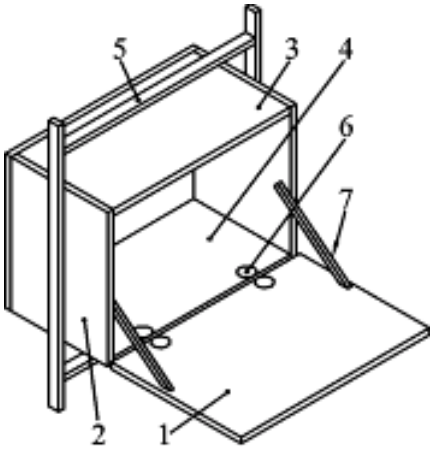
In cases where the flap parameters (e.g. height, width, mass) are not specified by the manufacturer, the tests may be carried out using the standard flap sizes specified in Table B.1 (A, B, C or D).



Key

1 Test flap
2 Test side
3 Test top
4 Test bottom
5 Test frame
6 Additional mass

Figure 1 — Test frame − Top hinged flap



Key

1 Test flap
2 Test side
3 Test top
4 Test bottom
5 Test frame
6 Hinge
7 Stay

Figure 2 — Test frame − Bottom hinged flap

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	(1 100 ± 100) N
Density	EN 323	(0,65 ± 0,05) g/cm³

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 downwards static overload

One corner of a closed top hinged flap (see Figure 3), or an open bottom hinged flap (see Figure 4), shall be loaded vertically downwards using the force specified in Annex B.

The load application points for top hinged flaps shall be at the surface 50 mm from the left, right and bottom edges, see Figure 3.

The load application points for bottom hinged flaps shall be at the surface 50 mm from the left, right and front edges, see Figure 4.

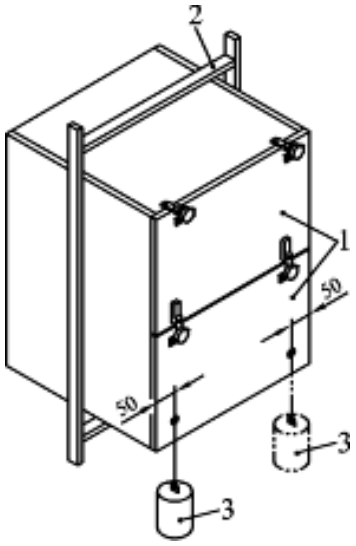
Carry out ten times.

Repeat the test five times in the opposite corner (see Figures 3 and 4).

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

The flap or parts of it shall not become detached.

Dimensions in millimetres



Key

1 Test flap
2 Test frame
3 Test load

Figure 3 — Vertical downwards static overload − Top hinged flaps

Dimensions in millimetres

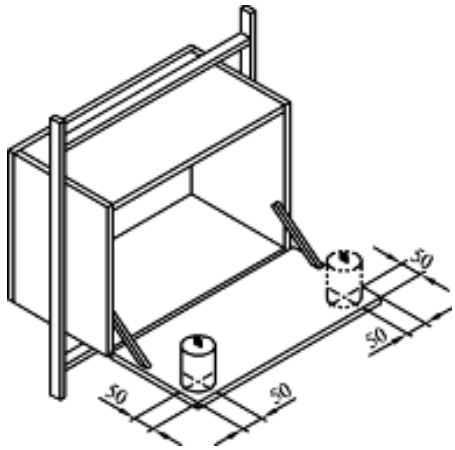


Figure 4 — Vertical downwards static overload − Bottom hinged flaps

6.2.2 Horizontal sideways static overload

6.2.2.1 Top hinged flaps

Flaps able to stay in an opened position shall be tested in the most adverse position.

Apply the horizontal static load specified in Annex B at the middle of the flap thickness in the direction of the plane of the flap 50 mm from the edge furthest away from the hinges, see Figure 5.

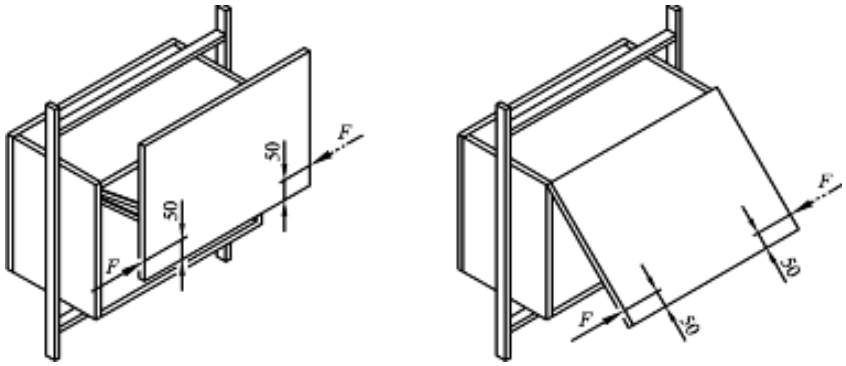
Carry out five times.

Repeat the test five times in the opposite direction of the front (Figure 5).

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

The flap or parts of it shall not become detached.

Dimensions in millimetres



Key
F load

Figure 5 — Horizontal sideways static overload − Top hinged flap

6.2.2.2 Bottom hinged flaps

Fully open the flap.

Apply the horizontal static load specified in Annex B at the middle of the flap thickness in the direction of the plane of the flap 50 mm from the edge furthest away from the hinges, see Figure 6.

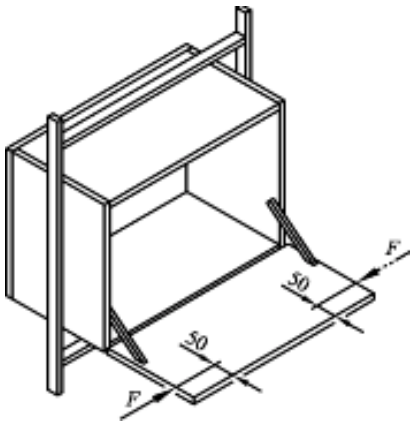
Carry out five times.

Repeat the test five times in the opposite direction (Figure 6).

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

The flap or parts of it shall not become detached.

Dimensions in millimetres



Key
F load

Figure 6 — Horizontal sideways static overload − Bottom hinged flap

6.2.3 Slam test

6.2.3.1 Top hinged flaps

The flap shall be slammed closed ten times by means of a string and pulley and the mass m; mass m is made up of m_1 and m_2. m_1 is the minimum mass to start moving the flap in the closing direction.

Mass m_2 is defined in Table B.2.

The string shall be attached to the middle of the width of the inside of the flap 25 mm from the lowest edge. The string shall not influence the closing of the door, e.g. it may be necessary to make a small cut-out in the test frame bottom panel.

Adjustable braking mechanisms shall be adjusted to the minimum level at which the braking system fulfils its function.

The closing distance shall be 200 mm measured from the attachment point at the flap to the pivotal point of the pulley (Figure 7).

The mass shall act until 10 mm before the flap is fully closed or if the flap has a damper, 10 mm before the damper is activated. There shall be 10 s pause between each cycle.

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

The flap, hinges, stays and their components shall not become detached and the damper, if available, shall fulfil its function.

Dimensions in millimetres

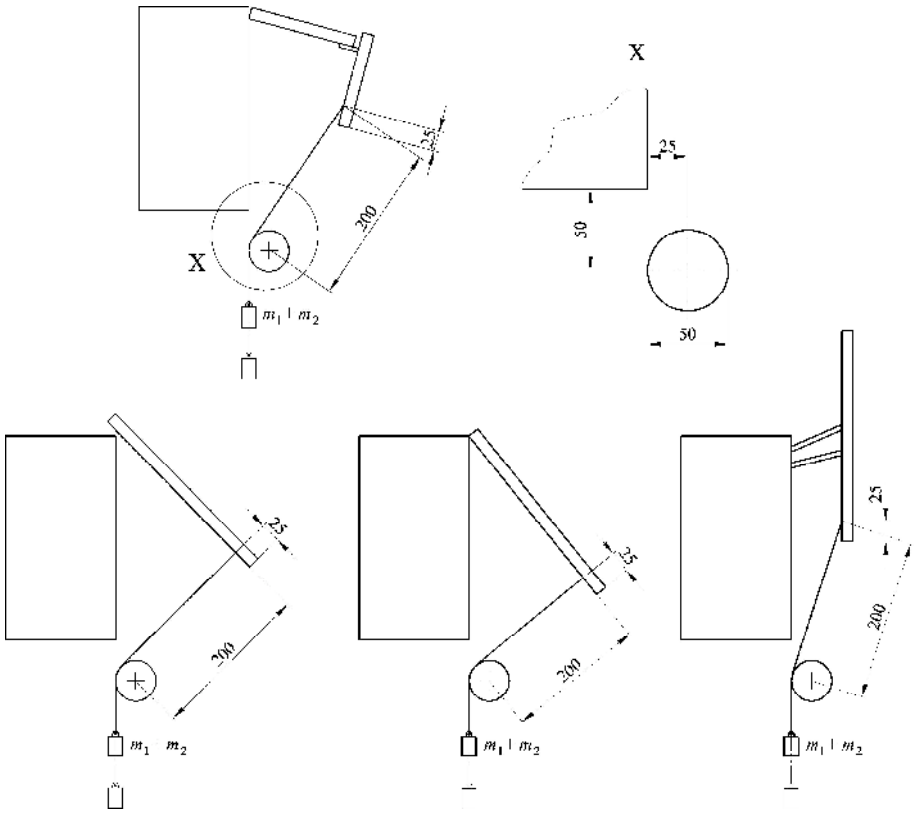


Figure 7 — Slam test − Top hinged flaps

6.2.3.2 Bottom hinged flaps

The flap shall be slammed open ten times from an opening angle of 60° by means of a mass specified in Annex B (Figure 8).

Adjustable braking mechanisms shall be adjusted to the minimum level at which the braking system fulfils its function.

The masses shall act until 10 mm before the flap is fully open or if the flap has a damper, 10 mm before the damper is activated. There shall be 10 s pause between each cycle.

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

The flap, hinges, stays and their components shall not become detached and the damper, if available, shall fulfil its function.

Dimensions in millimetres

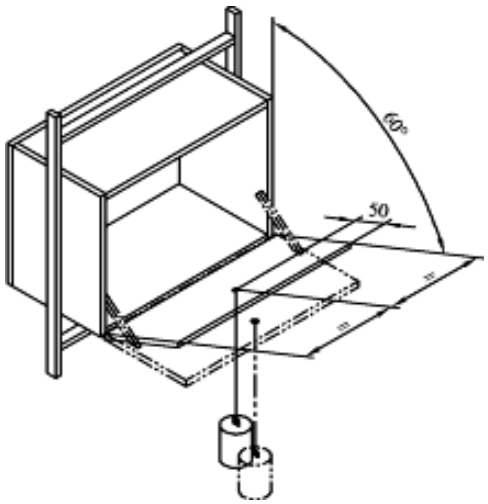


Figure 8 — Bottom hinged flaps − Slam test

6.3 Functional tests

6.3.1 General

During testing according to 6.3, the flap shall be loaded according to Annexes A and 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 shall be carried out with the minimum size and weight of the flap and the maximum size and weight of the flap.

6.3.2.2 Opening and closing forces

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

The opening and closing forces, F, shall be measured at the measuring point (see Figure 9), through the full opening angle using a constant and slow opening/closing speed.

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

The measuring point shall be at the middle of the flap width, 45 mm from the edge furthest away from the hinges or as specified by the manufacturer.

During opening and closing, the direction of force is to be adjusted to the movement in order to minimise the necessary forces to move the flap.

For flaps with a mass up to 10 kg, the forces shall not exceed 50 N. For flaps with a mass more than 10 kg, the forces shall not exceed 70 N.

Dimensions in millimetres

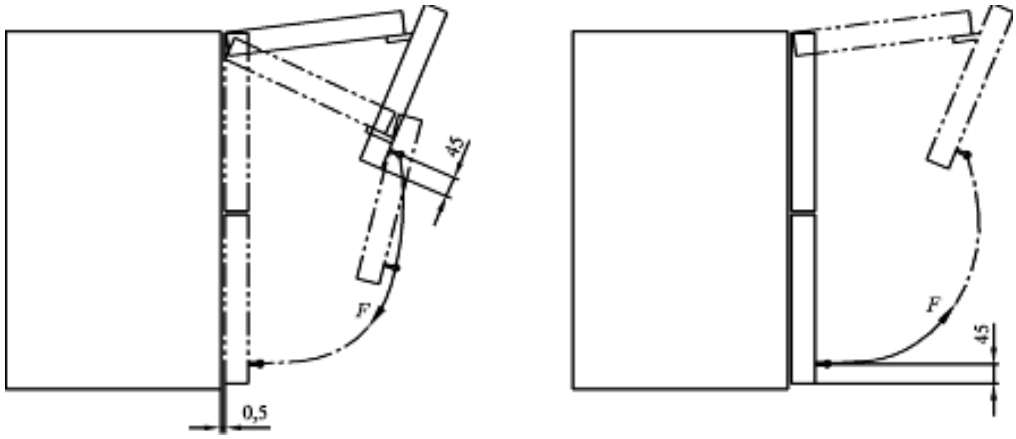


Figure 9 — Opening and closing forces

6.3.2.3 Closing force, all flaps with self-closing mechanisms

The closing force of hinges with self-closing mechanisms shall be measured.

Before measuring the closing force F, the flap shall be fully opened ten times by hand.

The opening force shall be applied at a point 45 mm from the bottom edge and at the middle of the flap width or as specified by the manufacturer. The flap 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 at the left and right sides at the edge furthest away from the hinges for systems with flaps consisting of a single component and at all four corners for flaps consisting of more than one component.

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 in order to obtain the maximum self closing force.

The closing force of hinges with self-closing mechanisms shall not be less than 2 N before and after the durability test.

6.3.3 First vertical downwards static load for top hinged flaps

Close the front and apply the vertical static load specified in Annex B. The load application points shall be at the surface 50 mm from the left, right and bottom edges, see Figure 3.

Carry out five times.

Repeat the test five times at the opposite corner of the front (Figure 3).

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

After the test, the hinges/stays/system and their components shall fulfil their function.

6.3.4 First horizontal sideways static load

6.3.4.1 Top hinged flaps

Flaps able to stay in an opened position shall be tested in the most adverse position.

Apply the horizontal static load specified in Annex B at the middle of the flap thickness in the direction of the plane of the flap 50 mm from the edge furthest away from the hinges, see Figure 5.

Carry out five times.

Repeat the test five times in the opposite direction of the front (Figure 5).

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

After the test, the hinges/stays/system and their components shall fulfil their function.

6.3.4.2 Bottom hinged flaps

Fully open the flap.

Apply the horizontal static load specified in Annex B at the middle of the flap thickness in the direction of the plane of the flap 50 mm from the edge furthest away from the hinges, see Figure 6.

Carry out five times.

Repeat the test five times in the opposite direction (Figure 6).

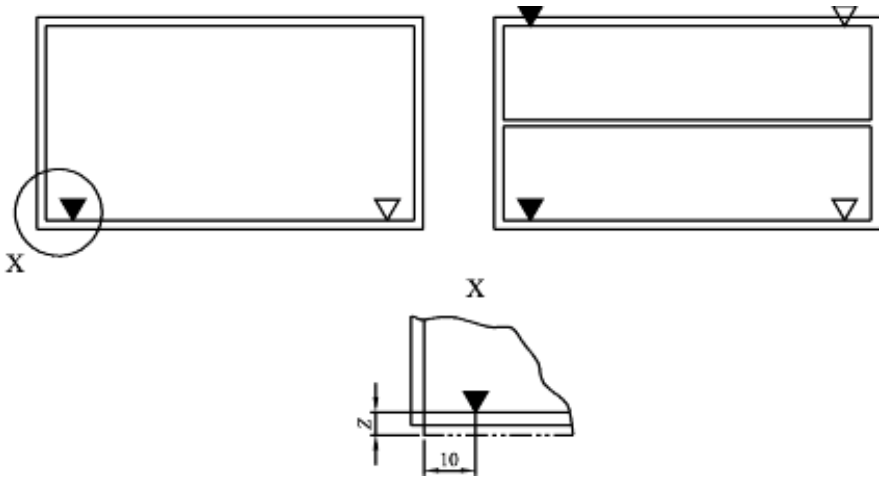
Carry out inspection and assessment according to 4.6 without the test load.

After the test, the hinges/stays/system and their components shall fulfil their function.

6.3.5 Determination of reference points for the flap sagging

The reference points shall be 10 mm from the left and right edges of the closed flap before the durability test, see 6.3.6 and Figure 10.

Dimensions in millimetres



Key
Z Sagging

Figure 10 — Measuring the flap sagging

6.3.6 Durability

The flap shall be fully opened and fully closed for the number of cycles according to Annexes A and B, without forcing built-in stops in the open position.

The flap 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 flap. 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 four to six cycles per minute with the pause in the closed position.

The opening and closing forces shall be applied at the middle of the flap width, 50 mm from the edge furthest away from the hinges or as specified by the manufacturer.

Carry out inspection and assessment according to 4.6.

After the test, the flap and its components shall fulfil its functions.

6.3.7 Sagging

After the durability test, the sagging (Z in Figure 10) 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 flap.

6.3.8 Second vertical downwards static load

The closed top hinged flap (Figure 3) respectively the open bottom hinged flap (Figure 4) shall be loaded in one corner vertically downwards using the force specified in Annex B.

The load application points for top hinged flaps shall be at the surface 50 mm from the left, right and bottom edges, see Figure 3.

The load application points for bottom hinged flaps shall be at the surface 50 mm from the left, right and front edges, see Figure 4.

Carry out five times.

Repeat the test five times in the opposite corner (see Figures 3 and 4).

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

After the test, the hinges/stays/system and their components shall fulfil their function.

6.3.9 Second horizontal sideways static load

6.3.9.1 Top hinged flaps

Flaps able to stay in an opened position shall be tested in the most adverse position.

Apply the horizontal static load specified in Annex B at the middle of the flap thickness in the direction of the plane of the flap 50 mm from the edge furthest away from the hinges, see Figure 5.

Carry out five times.

Repeat the test five times in the opposite direction of the front (Figure 5).

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

After the test, the hinges/stays/system and their components shall fulfil their function.

6.3.9.2 Bottom hinged flaps

Fully open the flap.

Apply the horizontal static load specified in Annex B at the middle of the flap thickness in the direction of the plane of the flap 50 mm from the edge furthest away from the hinges, see Figure 6.

Carry out five times.

Repeat the test five times in the opposite direction (Figure 6).

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

After the test, the hinges/stays/system and their components shall fulfil their function.

6.3.10 Operating forces

The operating forces shall be measured as specified in 6.3.2.

6.3.11 Slam test

6.3.11.1 Top hinged flaps

The flap shall be slammed closed ten times by means of a string and pulley and the mass m; mass m is made up of m_1 and m_2. m_1 is the minimum mass to start moving the flap in the closing direction.

Mass m_2 see Table B.3.

The string shall be attached to the middle of the width of the inside of the flap 25 mm from the lowest edge. The string shall not influence the closing of the door, e.g. by making a small cut-out in the bottom panel.

Adjustable braking mechanisms shall be adjusted to the minimum level at which the braking system fulfils its function.

The closing distance shall be 200 mm measured from the bottom edge of the flap to the lower front edge of the test frame (Figure 7).

The mass shall act until 10 mm before the flap is fully closed or if the flap has a damper, 10 mm before the damper is activated. There shall be 10 s pause between each cycle.

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

After the test, the hinges/stays/system and their components shall fulfil their function.

6.3.11.2 Bottom hinged flaps

The flap shall be slammed closed ten times by means of a string and pulley and the mass m; mass m is made up of m_1 and m_2. m_1 is the minimum mass to start moving the flap in the closing direction.

Mass m_2 see Table B.3.

Adjustable braking mechanisms shall be adjusted to the minimum where the braking system fulfils its function.

The closing distance shall be 100 mm (see Figure 11).

The masses shall act until 10 mm before the flap is fully closed or if the flap has a damper, 10 mm before the damper is activated. There shall be 10 s pause between each cycle.

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

After the test, the hinges/stays/system and their components shall fulfil their function.

Dimensions in millimetres

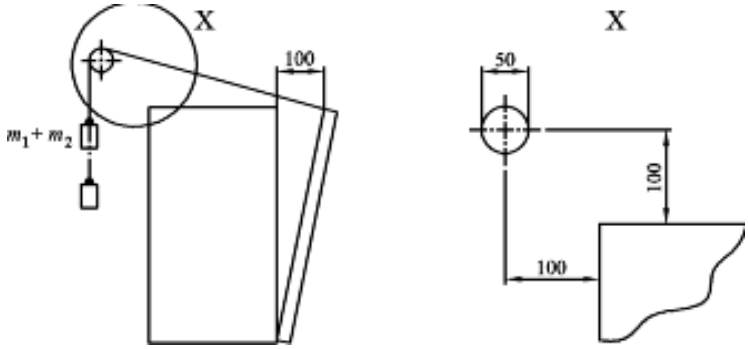


Figure 11 — Slam test − Bottom hinged flaps

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: three 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 the following information:

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

b) details of the hinges/stays used for testing;

c) the test flap parameters;

d) any defects observed before testing;

e) the test results according to 6.2.1 to 6.4;

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

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

h) details of any deviations from this European Standard;

i) the name and address of the test facility;

j) the 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 flap hinges for a given purpose. Therefore, information shall be given by the manufacturer of the flap 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 flap hinges 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 Mass and size of the flap

The product information shall include information regarding the mass (m) in kilograms, the size of the flap and any additional masses (e.g. handles, buttons) as well as the number of hinges for which the flap 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 Tables B.2 and B.3, columns 1, 2 and 3 are considered to be suitable for hinges for most fields of application from domestic to contract use.

Table B.1 — Flap dimensions

Flap		Test flap parameters		
Type	Material	Height mm	Width mm	Thickness mm
A	(single front) Particle board	350	600	19
B	(single front) Particle board	500	600	19
C	(single front) Particle board	700	600	19
D	(multiple front) Particle board	700 (2 × 350)	600	19

Table B.2 — Overloads tests

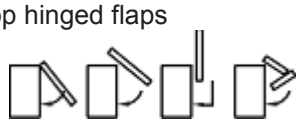
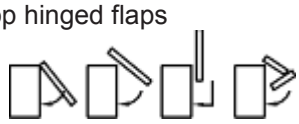
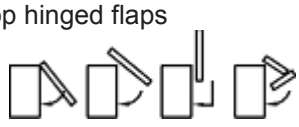
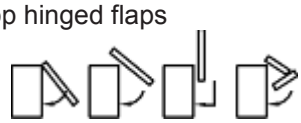
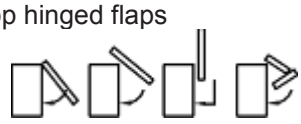
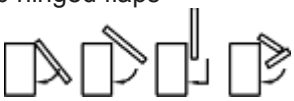
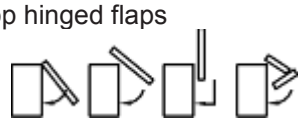
Subclause	Test	1	2	3
6.2.1	top hinged flaps 	150 N	150 N	150 N
	bottom hinged flaps 	150 N	200 N	250 N
6.2.2.1	top hinged flaps 	100 N	100 N	100 N
6.2.2.2	bottom hinged flaps 	100 N	125 N	150 N
6.2.3.1	top hinged flaps 	2 kg	2,5 kg	3 kg
6.2.3.2	bottom hinged flaps 	2 kg	2,5 kg	3 kg

Table B.3 — Functional tests

Subclause	Test	1	2	3
6.3.3 6.3.8	top hinged flaps 	50 N	50 N	50 N
	bottom hinged flaps 	75 N	100 N	125 N
6.3.4 6.3.9	top hinged flaps 	50 N	50 N	50 N
	bottom hinged flaps 	50 N	75 N	100 N
6.3.6	top hinged flaps 	10 000 cycles	20 000 cycles	40 000 cycles
	bottom hinged flaps 	5 000 cycles	10 000 cycles	20 000 cycles
6.3.11.1 6.3.11.2	top hinged flaps 	1 kg (m_2)		
	bottom hinged flaps 			

Bibliography

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

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