BRITISH STANDARD

BS EN 15706:2009

Hardware for furniture — Strength and durability of slide fittings for sliding doors and roll fronts

ICS 97.140

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 15706:2009.

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

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Quincaillerie d'ameublement - Résistance mécanique et endurance des éléments de coulissement pour portes coulissantes et rideaux coulissants

Möbelbeschläge - Festigkeit und Dauerhaltbarkeit von Beschlägen für Schiebetüren und Rollläden

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Foreword

This document (EN 15706:2009) 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of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by October 2009.

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Introduction

The aim of this draft European Standard is to provide furniture manufacturers, designers and developers with comparable information regarding the performance of all types of slide fittings and their components for sliding doors and roll fronts.

1 Scope

This European Standard EN 15706 specifies test methods and requirements for the strength and durability of all types of slide fittings for all types of sliding doors and roll fronts sliding horizontally and vertically 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 8, 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 fittings and the parts used for the attachment.

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 fittings 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 the corrosion test in Clause 8, ageing and influences of heat and humidity are not included.

Annex A (normative): Product information system.

Annex B (normative): Test parameters.

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, which keeps or pulls a sliding door/roll front 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 sliding door/roll front gently

3.3
loading capacity
M
mass in kg, as specified by the manufacturer, for which the slide fitting will fulfil the strength and durability requirements. The loading capacity includes the weight of the sliding door/roll front and load on it, e.g. mirrors

3.4
horizontal sliding door
one or more front elements, which can be moved in the horizontal direction

3.5
vertical sliding door
one or more front elements, which can be moved in the vertical direction

3.6
horizontal roll front
front element usually consisting of many narrow parts, which can be moved in the horizontal direction

3.7
vertical roll front
front element usually consisting of many narrow parts, which can be moved in the vertical direction

4 General test conditions

4.1 Preliminary preparation

The fittings shall be assembled/mounted according to the manufacturer's instructions supplied with the product.

If mounting, adjustment or assembly 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.

Fittings 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 at least 7 days before testing.

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 fittings 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 door/roll front, i.e. it shall be able to move so that it will allow the deflection of the test sliding door/roll front during testing.

All loading pads (if included) shall be capable of pivoting in relation to the direction of the applied force. The pivot point shall be as close as practically possible to the load surface.

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;

Angle ± 2° of nominal angle.

The accuracy for the positioning of loading pads 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 applicable.

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

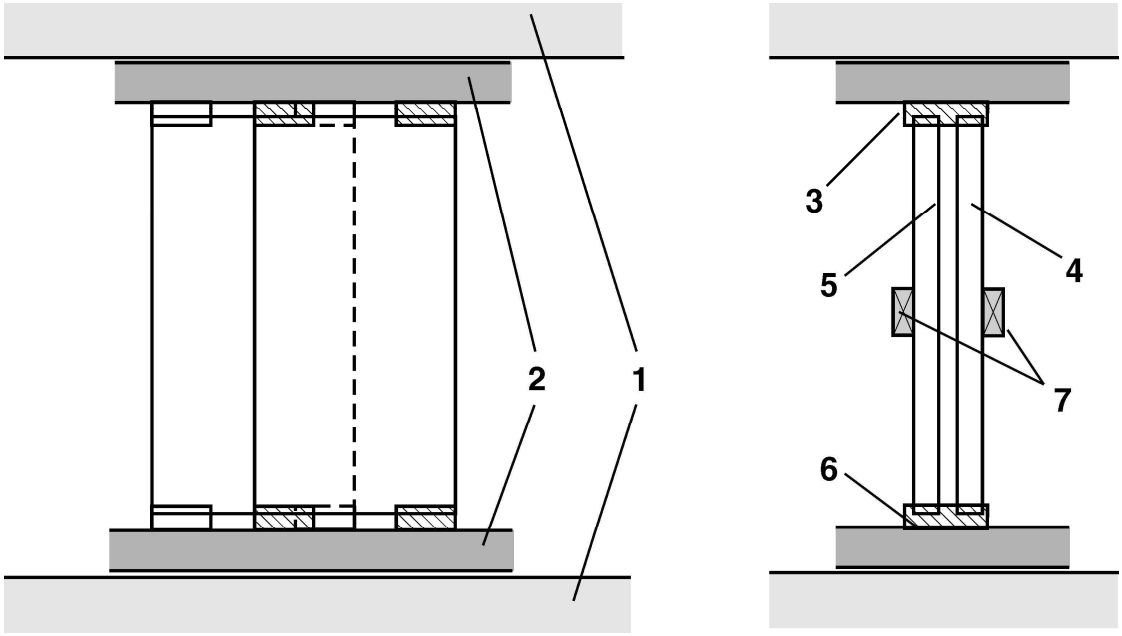
The tests specified in 6.2, 6.3, 7.2 and 7.3 shall be carried out in a test frame (see an example in Figure 1), which is so constructed that the deformation under the applied loads and in the direction of the applied loads is no more than 2 %.

Unless otherwise specified by the manufacturer, fittings shall be mounted on particle board as specified in 5.3.

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

The position of fittings and components on the sliding door/roll front and the test frame as well as the size and weight of the sliding door/roll front shall be as specified by the manufacturer, see Annex A (normative).

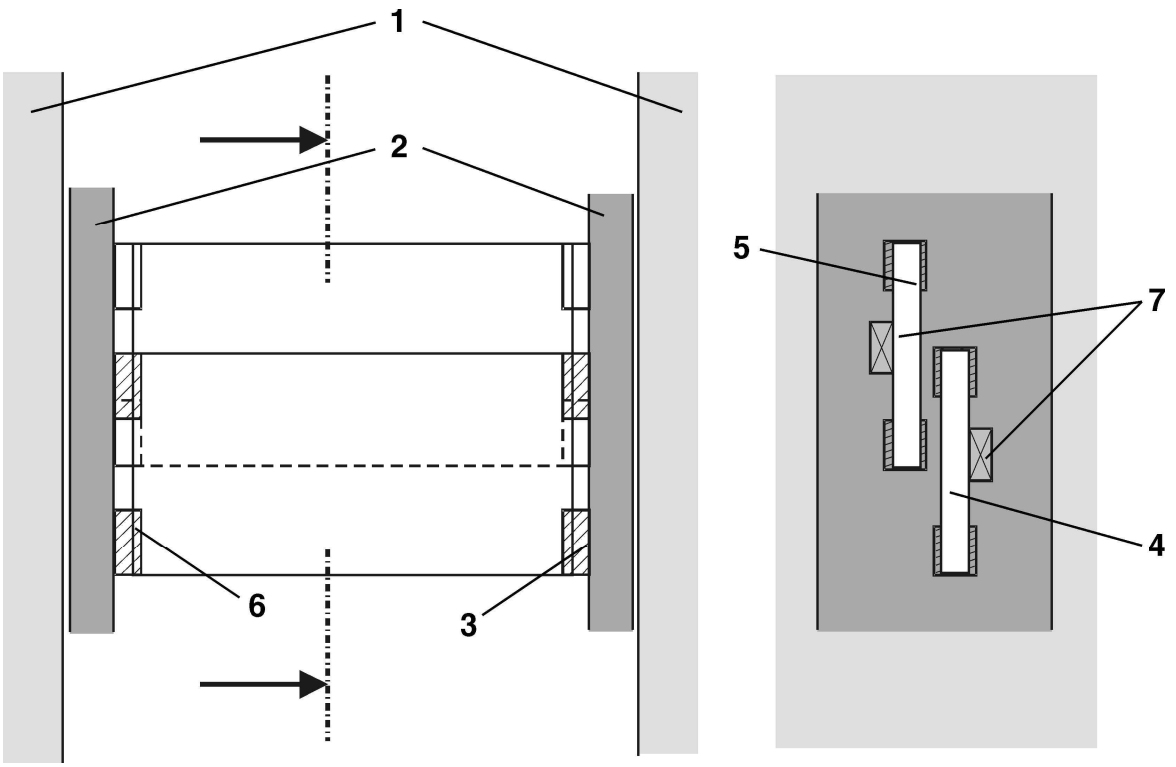
The tests shall be carried out using the standard door sizes specified in Annex B (normative), except in cases where the sliding door/roll front parameters (e.g. height, width, mass) are specified by the manufacturer.



Key

1 Test frame
2 Particle board
3 Top runner/guide
4 Front door
5 Rear door
6 Lower runner/guide
7 Additional load

Figure 1a — Example of test frame for horizontal sliding doors



Key

1 Test frame
2 Particle board
3 Right runner/guide
4 Front door
5 Rear door
6 Left runner/guide
7 Additional load

Figure 1b — Example of test frame for vertical sliding doors

5.3 Particle board

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 ± 100) N
Density	EN 323:1993	(0,65 ± 0,05) g/cm^3

5.4 Loading pad

Rigid disc 100 mm in diameter (or 50 mm to be used in limited space), with a flat face and a 12 mm front edge blend radius.

6 Test procedures and requirements for horizontal sliding doors and roll fronts

6.1 General

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

a) the first set shall be used for the first test sequence specified in 6.2;

b) the second set shall be used for the second test sequence specified in 6.3;

c) the third set shall be used for the corrosion test specified in Clause 8.

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

6.2 Overload test

6.2.1 General

During testing according to 6.2, the slide fittings shall be loaded according to Annex A.

6.2.2 Slam test for slide fittings with built-in end stops

The sliding door/roll front shall be opened/closed by means of a string or cord attached in line with the front surface, at the mid height of the sliding door/roll front, 10 mm from the edge, unless otherwise specified (see Figure 2).

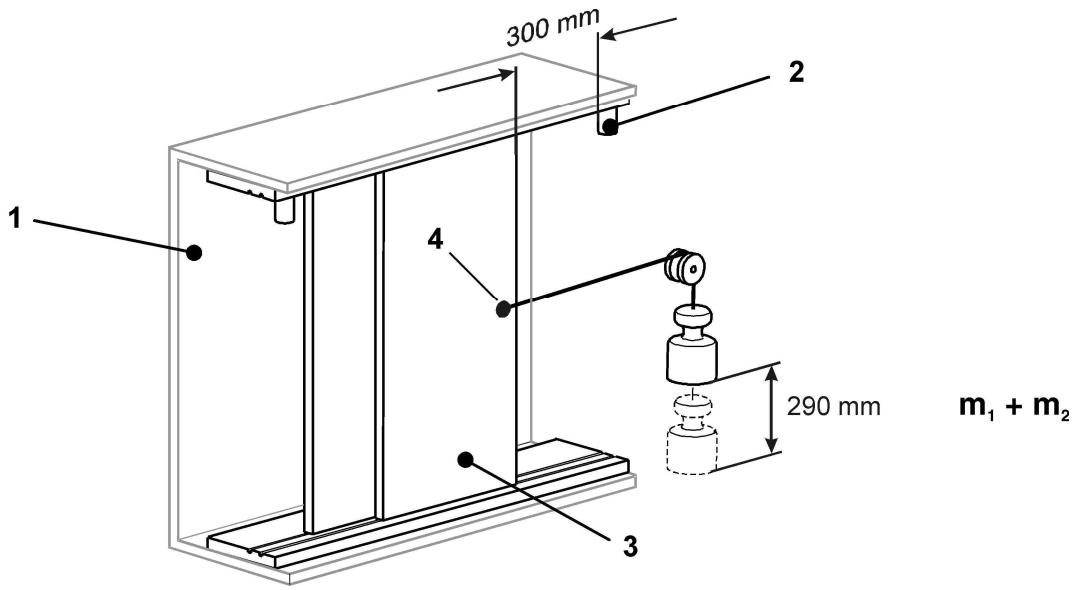
Determine the mass, m_1, required to just move the sliding door/roll front. The test mass shall be $m_1 + m_2$ according to Annex B.

Close/open the sliding door/roll front 10 times towards the fully closed/opened positions using the mass $(m_1 + m_2)$.

Start the movement 300 mm from the closed/opened positions respectively. The test mass shall act until 10 mm before the sliding door/roll front is fully closed/opened. The test shall be carried out as shown in Figure 2.

In the case of damping or self closing mechanism the test mass shall act until 10 mm before the mechanism starts.

The sliding door/roll front, the fittings and their components shall not become detached.



Key

1 Test frame
2 End stop
3 Test door
4 Force application point (mid height, 10 mm from the edge)

Figure 2 — Slam test

6.2.3 Pull-out test

This test is only applicable to sliding doors/roll fronts which are not designed to be removed by lifting and pulling out.

The sliding door/roll front shall be in the most unfavourable position during the test.

The sliding door/roll front shall be lifted using an upward force F (Annex B) applied at an angle of 10° to the front surface, at the mid height of the sliding door/roll front, 10 mm from the edge (see Figure 3).

The sliding door/roll front, the fittings and their components shall not become detached.

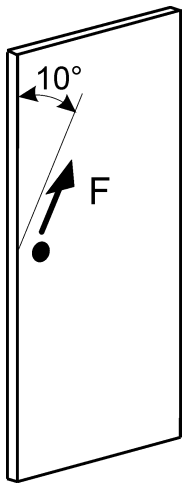


Figure 3 — Pull-out test

6.2.4 Horizontal static load test

This test is only applicable to complete systems which include both slide fittings and sliding door/roll front.

Load by means of the loading pad (5.4) the centre of the sliding door/roll front (Figure 6) 10 times according to Annex B. The sliding door/roll front shall be in the most unfavourable position during the test.

The sliding door/roll front, the fittings and their components shall not become detached.

6.3 Functional tests

6.3.1 General

During testing according to 6.3, the slide fittings shall be loaded according to Annex A and Annex B.

6.3.2 Operating forces

The maximum operating forces for opening and closing, excluding the forces of catches, dampers, self opening and self closing mechanisms shall be measured and recorded in the test report with an accuracy of ± 0,5 N before the first slam/shut test (6.3.5) and before the deflection test (6.3.8).

The force application point a shall be in line with the front surface, at the mid height of the sliding door/roll front, height 10 mm from the edge.

The measuring direction shall be horizontal and in the direction of the applied force.

The measurements shall be carried out so slowly that the influence of dynamic force is negligible.

The determination of the maximum opening force shall cover the range from the fully closed to the fully open position. In the case of slide fittings with stops in the open position, the determination of the maximum closing force shall cover the range from the point, where the door is 5 mm from fully open to fully closed position.

When the door mass is < 40 kg, the opening and closing forces shall not exceed 50 N.

When the door mass is ≥ 40 kg, the opening and closing forces shall not exceed 12,5 % of the maximum door mass.

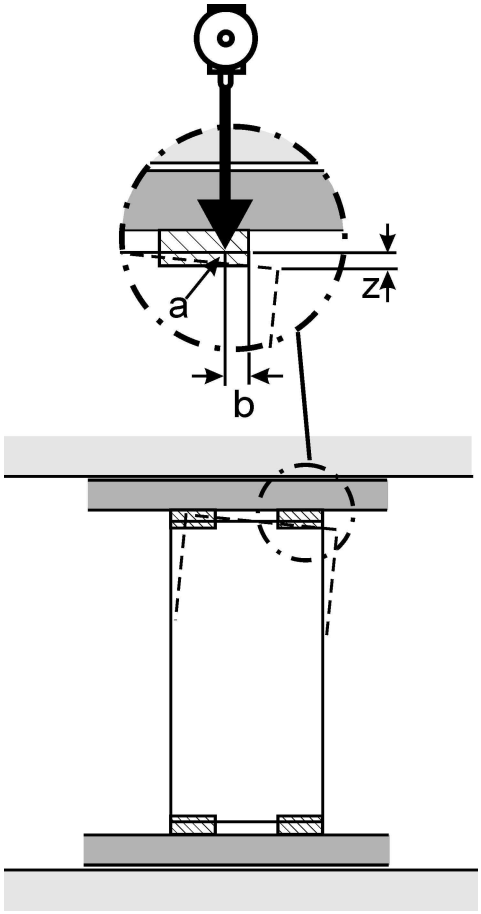
6.3.3 Closing function, fittings with self-closing mechanisms

Before testing, the sliding door/roll front shall be fully opened and closed 10 times by hand without forcing the self-closing mechanism.

The sliding door/roll front shall be moved slowly towards the position where the self-closing mechanism starts to function with a velocity of approximately 1 mm/s. Before and after the durability test check that the self-closing mechanisms closes the sliding door/roll front without any additional force.

6.3.4 Determination of sagging reference point (a)

The reference point (a) on a line 10 mm from the end of the door, see Figure 4, shall be determined on the closed sliding door/roll front before the first slam shut/open test.



Key

a Reference point
b 10 mm
z Vertical sag

Figure 4 — Measuring the door vertical sagging, z

6.3.5 First slam shut/open

This test is only applicable to slide fittings with built-in end stops.

The sliding door/roll front shall be opened/closed by means of a string or cord attached in line with the front surface, at the mid height of the sliding door/roll front, height 10 mm from the edge.

Determine the mass, m_1, required to just move the sliding door/roll front. The test mass shall be $m_1 + m_2$ according to Annex B.

Close/open the sliding door/roll front 5 times towards the fully closed/opened positions using the masses $(m_1 + m_2)$

Start the movement 300 mm from the closed/opened positions respectively. The test mass shall act until 10 mm before the sliding door/roll front is fully closed/opened. The test shall be carried out as shown in Figure 2.

In the case of damping or self closing mechanism the test mass shall act until 10 mm before the mechanism starts to function.

Carry out inspection and assessment according to 4.6.

After the test, the slide fittings and their components shall fulfil their functions.

6.3.6 Durability

Fully open and close the sliding door/roll front (see Figure 1) gently and without supporting the sliding door/roll front for the number of cycles specified in Annex B.

If the rollers have dampers and/or catch devices, including self-opening and self-closing mechanisms, these shall be allowed to operate at each cycle. End stops shall not be forced.

Unless otherwise specified, apply the force in line with the front surface, at the mid height of the sliding door/roll front, 10 mm from the edge. The average speed shall be (0,25 ± 0,1) m/s.

If the sliding door/roll front has a damper or a catch device, the speed *v* at the beginning of the self-closing or catch operation shall be calculated as follows

$$v = \frac{35}{95 + M}\left[m/s\right],$$

where *M* is the loading capacity (3.3).

If heating occurs, a pause equal to 5 cycles shall be made after each 5 cycles. This shall be recorded in the test report.

Carry out inspection and assessment according to 4.6.

After the test, the slide fittings and their components shall fulfil their functions.

6.3.7 Second slam shut/open

This test is only applicable to slide fittings with built-in end stops.

The sliding door/roll front shall be opened/closed by means of a string or cord attached in line with the front surface, at the mid height of the sliding door/roll front, 10 mm from the edge, unless otherwise specified (see Figure 2).

Determine the mass, m_1, required to just move the sliding door/roll front. The test mass shall be $m_1 + m_2$ according to Annex B.

Close/open the sliding door/roll front 5 times towards the fully closed/opened positions using the masses $(m_1 + m_2)$.

Start the movement 300 mm from the closed/opened positions respectively. The test mass shall act until 10 mm before the sliding door/roll front is fully closed/opened. The test shall be carried out as shown in Figure 2.

In the case of damping or self closing mechanism the test mass shall act until 10 mm before the mechanism starts to function.

Carry out inspection and assessment according to 4.6.

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

6.3.8 Sagging

Determine the position of the reference point, 6.3.4, with an accuracy of ± 0,1 mm.

For doors weighing less than 40 kg the sagging shall not exceed 2 mm; for doors weighing more than 40 kg the sagging shall not exceed 0,05 mm per 1 kg mass up to a maximum of 5 mm.

7 Test procedures and requirements for vertical sliding doors and roll fronts

7.1 General

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

a) the first set shall be used for the first test sequence specified in 7.2;

b) the second set shall be used for the second test sequence specified in 7.3;

c) the third set shall be used for the corrosion test specified in 8.

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

7.2 Overload tests

7.2.1 General

During testing according to 7.2, the slide fittings shall be loaded according to Annex B (max weight, M).

7.2.2 Slam shut/open

Allow the sliding door/roll front to fall freely 10 times from as near to the point of equilibrium as possible (see Figure 5) or at least 300 mm from fully closed/open. If the sliding door/roll front does not move, the test shall be carried out according to the same principle as for horizontal sliding door/roll fronts (6.2.2) with the force applied on the vertical centreline.

The sliding door/roll front, the fittings and their components shall not become detached.

NOTE Safety requirements regarding movement of vertically moving sliding doors and roll fronts exist in EN standards for furniture (EN 14749 [1] and EN 14073-2 [2]).

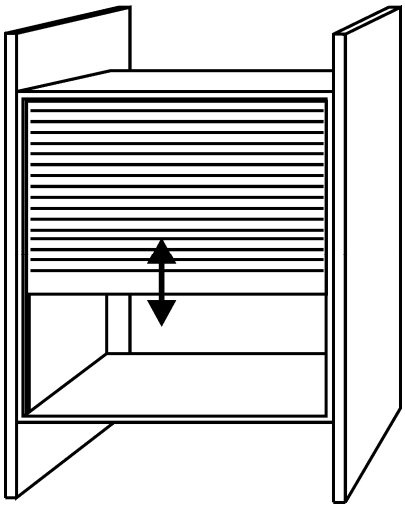


Figure 5 — Slam shut/open

7.2.3 Horizontal static load test

This test is only applicable to complete systems which include both slide fittings and sliding door/roll front.

Load by means of the loading pad (5.4) the centre of the sliding door/roll front (Figure 6) 10 times according to Annex A (normative). The sliding door/roll front shall be in the most unfavourable position during the test.

The sliding door/roll front, the fittings and their components shall not become detached.

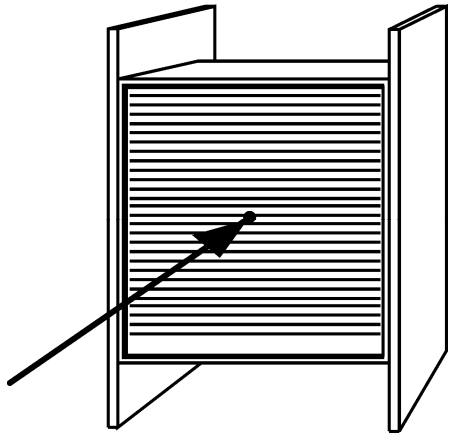


Figure 6 — Horizontal static load test

7.3 Functional tests

7.3.1 General

During testing according to 7.3, the slide fittings shall be loaded according to Annex A and Annex B.

7.3.2 Operating forces

The maximum operating forces for opening and closing, excluding the forces of catches, dampers, self opening and self closing mechanisms shall be measured and recorded in the test report with an accuracy of ± 0,5 N before the first slam/shut test (7.3.3) and after the second slam/shut test (7.3.5).

The force application point a shall be in line with the front surface, at the mid height of the sliding door/roll front, height 10 mm from the edge.

The measuring direction shall be horizontal and in the direction of the applied force.

The measurements shall be carried out so slowly that the influence of dynamic force is negligible.

The determination of the maximum opening force shall cover the range from the fully closed to the fully open position. In the case of slide fittings with stops in the open position, the determination of the maximum closing force shall cover the range from the point, where the door is 5 mm from fully open to fully closed position.

When the door mass is < 40 kg, the opening and closing forces shall not exceed 50 N.

When the door mass is ≥ 40 kg, the opening and closing forces shall not exceed 12,5 % of the maximum door mass.

7.3.3 First slam shut/open

The sliding door/roll front shall be allowed to fall freely 5 times from as near to the point of equilibrium as possible (see Figure 5) or at least 300 mm from fully closed. If the sliding door/roll front does not move, the test shall be carried out according to the same principle as for horizontal sliding doors/roll fronts (6.2.2).

Carry out inspection and assessment according to 4.6.

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

7.3.4 Durability

Fully open and close the sliding door/roll front (see Figure 5) gently and without supporting the door for the number of cycles specified in Annex B. The door travel shall be approximately the door height.

If the rollers have dampers and/or catch devices, including self-opening and self-closing mechanisms, these shall be allowed to operate at each cycle.

Open and close the sliding door/roll front with an average speed of (0,25 ± 0,1) m/s.

If heating occurs, a pause equal to 5 cycles shall be made after each 5 cycles. This shall be recorded in the test report.

Carry out inspection and assessment according to 4.6.

After the test, the slide fittings and their components shall fulfil their functions.

7.3.5 Second slam shut/open

Allow the sliding door/roll front to fall freely from as near to the point of equilibrium as possible (see Figure 5) or at least 300 mm from fully closed, for 5 times. If the sliding door/roll front does not move, the test shall be carried out according to the same principle as for horizontal sliding doors/roll fronts (6.2.2).

Carry out inspection and assessment according to 4.6.

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

8 Corrosion resistance

The corrosion test shall be carried out when required on the third set of rollers 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 rollers 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 (normative).

9 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 slide fittings tested, the test door parameters and the travel length;

c) any defects observed before testing;

d) test results according to the Clauses 6 to 8;

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

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 fittings for a given purpose. Therefore, information shall be given by the manufacturer of the fittings 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 fitting(s) are suitable, e.g. solid wood, particle board, glass.

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

A.3 The loading capacity and the maximum size of the sliding door/roll front

The product information shall include information regarding the loading capacity, the maximum size of the sliding door/roll front and the number of fittings for which the slide fitting(s) will fulfil the requirements of this standard.

A.4 Adjustment systems, built-in stops and spring and damper mechanisms

The product information shall include information regarding the presence of adjustment systems, built-in stops 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, levels 1, 2 and 3 are considered to be suitable for fittings for most fields of application from domestic to contract use.

Table B.1 — Sliding door dimensions and thickness

Type	Height mm	Width mm	Thickness mm
A, Particle board (5.3) [a]	2 000	1 000	19
B, Particle board (5.3) [a]	1 000	500	19
C, Particle board (5.3) [a]	500	500	19
[a] Doors of other materials shall have the same heights and widths.			

No standard parameters are specified for roll fronts and other constructions.

Table B.2 — Overload tests

Clause / Test	Unit	Loads		
		Level 1	Level 2	Level 3
6.2.2 Slam shut/open, m_2	kg	2	3	4
6.2.3 Pull-out	N	150	200	250
6.2.4 and 7.2.3 Horizontal static load	N	150	200	250

Table B.3 — Functional tests

Clause / Test	Unit	Loads and cycles		
		Level 1	Level 2	Level 3
6.3.5 First slam shut/open, m_2	kg	2	2	2
6.3.6 Horizontal sliding door and roll fronts durability	cycles	10 000	20 000	40 000
7.3.4 Vertical sliding doors and roll front durability	cycles	5 000	10 000	20 000
6.3.7 Second slam shut/open, m_2	kg	2	2	2

Bibliography

[1] EN 14749, *Domestic and kitchen storage units and worktops — Safety requirements and test methods*

[2] EN 14073-2, *Office furniture — Storage furniture — Part 2: Safety requirements*

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