



**International
Standard**

ISO 12808

**Hardware for furniture — Strength
and durability of extension
elements and their components**

*Quincaillerie d'ameublement — Résistance mécanique et
endurance des éléments extractibles et de leurs composants*

**First edition
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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 136, *Furniture*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The aim of this document is to provide furniture manufacturers, designers and developers with comparable information regarding the performance of extension elements and drawers.

The tests consist of the application of loads, forces and velocities simulating normal functional use, as well as misuse, that can 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 extension elements and the parts used for the attachment, e.g. 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 extension element tested. These results can be used to represent the performance of production models provided that the tested model is representative of the production model.

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Hardware for furniture — Strength and durability of extension elements and their components

1 Scope

This document specifies test methods and requirements for the strength and durability of all types of extension elements and their components for all fields of application, except table extensions.

With the exception of corrosion, ageing and the influence of heat and humidity are not covered in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 6270-2, *Paints and varnishes — Determination of resistance to humidity — Part 2: Condensation (in-cabinet exposure with heated water reservoir)*

ISO 9427, *Wood-based panels — Determination of density*

ISO 10289, *Methods for corrosion testing of metallic and other inorganic coatings on metallic substrates — Rating of test specimens and manufactured articles subjected to corrosion tests*

EN 320, *Particleboards and fibreboards — Determination of resistance to axial withdrawal of screws*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

catch device

device which keeps or pulls an *extension element* (3.2) in place, but does not require a second action in order to release it

EXAMPLE A magnetic catch or a self-closing or self-opening mechanism.

3.2

extension element

component that can be pulled out and pushed in

EXAMPLE Drawers, suspended pocket files, keyboard trays.

3.3 loading capacity

total mass

M

mass, as specified by the manufacturer, for which the *extension element* (3.2) fulfils the strength and durability requirements

Note 1 to entry: The load capacity is expressed in kg.

Note 2 to entry: The loading capacity includes the extension element and the load in/on the extension element.

3.4 damper

mechanism which gently brings the *extension element* (3.2) to a stop

4 Test conditions

4.1 General

The extension element shall be assembled/mounted in accordance with the instructions supplied with it.

If mounting 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.

For testing a range of related extension elements, only worst case(s) need to be tested.

The tests shall be carried out in indoor ambient conditions at a temperature between 15 °C and 27 °C. If during a test the temperature is outside of the range of 15 °C to 27 °C, the maximum and/or minimum temperature shall be recorded in the test report.

Extension elements which include structural hardware parts made of hygroscopic plastic materials, for example, polyamide, shall be conditioned at (23 ± 2) °C and a relative humidity of (50 ± 5) % for at least 7 d before testing.

In the case of designs not addressed in the test procedures, the test 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 extension element thoroughly. Record any defects so that they are not assumed to have been caused by the tests. Carry out measurements when specified.

4.2 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 $10 \text{ N} = 1 \text{ kg}$ may be used for this purpose.

4.3 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: $\pm 2^\circ$ of the nominal angle.

The accuracy for the positioning of loading pads shall be ± 5 mm.

4.4 Sequence of testing

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

4.5 Inspection and assessment of results

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

Before any measurements are taken, the loaded extension shall be moved 10 times over the total extension length.

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 equipment

5.1 General

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 deformation of the extension element, i.e. it shall be able to move so that it can follow the deformation of the extension element during testing.

5.2 Masses

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

5.3 Glass/steel marbles

Marbles are made of solid glass with a 10 mm to 15 mm diameter. They shall be in a flexible bag large enough to allow them to move in the bag during the test.

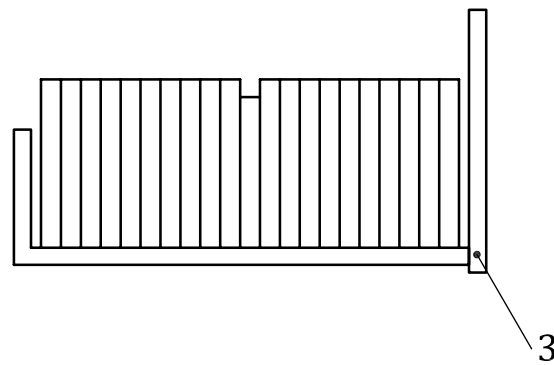
NOTE A bag that is approximately 50 % filled is considered loosely packed.

In cases where the volume of the glass marbles is greater than the volume of the extension element, steel marbles with 6-mm to 12-mm diameter shall be used. This shall be noted in the test report.

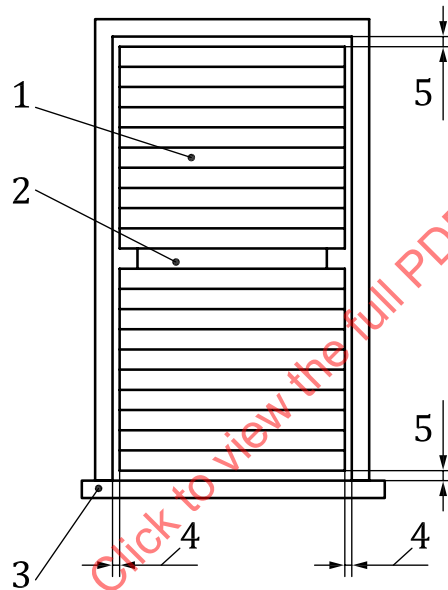
5.4 Loads for filing pockets

Suspended filing pockets shall be loaded with typing paper or an equivalent alternative as shown in [Figure 1 a\)](#) and [Figure 1 b\)](#).

In cases where it is not possible to achieve the loading capacity with paper, the additional mass shall be steel and shall be positioned as the spacing material. This shall be noted in the test report.



a) Side view of the extension element



b) Top view of the extension element

Key

- 1 typing paper
- 2 spacing material (for example, polystyrene) in the middle of the extension element
- 3 front of extension element
- 4 air gap
- 5 air gap 25 mm ± 6 mm

NOTE The air gap in Key 4 is determined by the paper size.

Figure 1 — Loading of suspended filing pockets with typing paper

5.5 Loading pad

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

All loading pads 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.

5.6 Test frame and test drawer

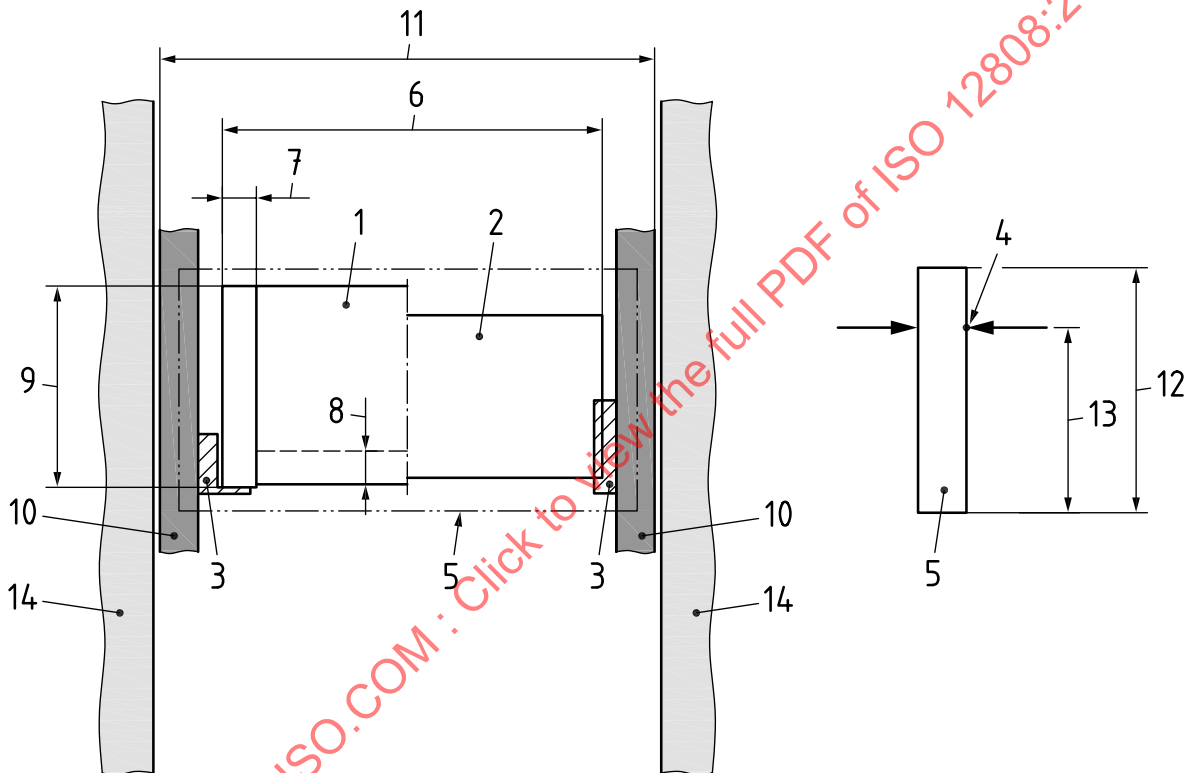
The tests specified in 6.2 and 6.3 shall be carried out in a rigid test frame, see Figure 2, constructed such that the deformation of the sides (see Figure 2, Key 10) under the applied load is no more than 1 mm.

Unless otherwise specified by the manufacturer, the extensions shall be mounted on particle board sides, see 5.7.

The distance between the outer surfaces of the particle board shall be specified by the manufacturer. If it is not specified, the distance (Figure 2, Key 11) shall be (590 ± 10) mm.

The height of the front shall be specified by the manufacturer. In cases where the height of the front is not specified, it shall be 300 mm. The force application point shall be 50 mm below the top of the front.

In cases where the extensions do not include a drawer, this shall, unless otherwise specified by the manufacturer, be made of 16 mm particle board, see 5.7.



Key

- 1 test drawer of particle board
- 2 extension element (alternative)
- 3 extension slides
- 4 force application point, opening and closing (see Annex A)
- 5 front, 16 mm particle board
- 6 "drawer" width
- 7 "drawer" sides, 16 mm particle board
- 8 "drawer" bottom, 16 mm particle board
- 9 "drawer" height
- 10 sides, 16 mm particle board
- 11 distance between the outer surfaces

- 12 front height
- 13 height to force application point, opening and closing (see [Annex A](#))
- 14 test frame

Figure 2 — Test frame and test drawer

5.7 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 N ± 100 N
Density	ISO 9427	0,65 g/cm ³ ± 0,05 g/cm ³

6 Test procedures and requirements

6.1 General

For the following tests, three sets of extensions 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](#).

6.2 Overload tests

6.2.1 General

During testing according to [6.2](#), the extension element shall be uniformly loaded in accordance with the loading capacity, *M*. The load shall be masses ([5.2](#)) unless otherwise specified.

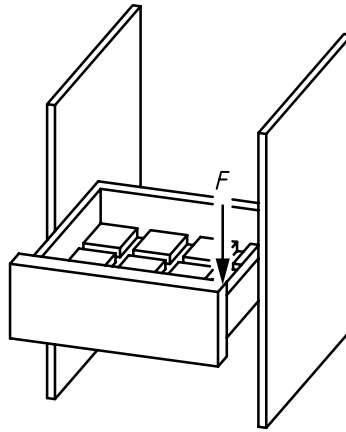
6.2.2 Vertical downwards static overload

Open the extension element to its open stops or if there are no open stops to the point at which one-third of the inside length (depth) of the extension element, or at least 100 mm, remains inside the test frame.

Apply through the loading pad ([5.5](#)) a vertical static force equal to the loading capacity, but not higher than the maximum force specified in [Annex C](#) on one top corner of the extension element front (see [Figure 3](#)).

Carry out this test 10 times.

The extension element or its parts shall not become detached.



Key

F force

Figure 3 — Vertical downwards static overload

6.2.3 Horizontal sideways static overload

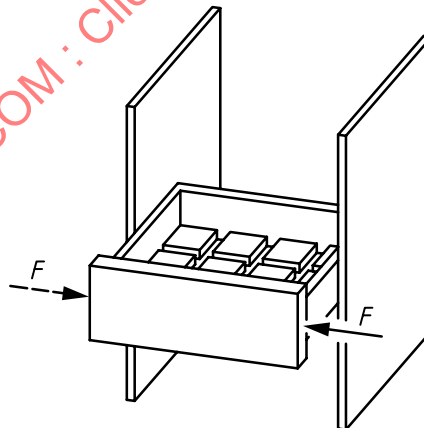
Open the extension element to its open stops or if there are no open stops to the point at which one-third of the inside length (depth) of the extension element, or at least 100 mm, remains inside the test frame.

Apply through the loading pad (5.5) a horizontal force equal to 50 % of the loading capacity, but not higher than the maximum force specified in Annex C to the centre of the side of the front (see Figure 4).

Carry out this test five times.

Repeat the test five times in the opposite direction of the front (see Figure 4).

The extension element or its parts shall not become detached.



Key

F force

Figure 4 — Horizontal sideways static overload

6.2.4 Outwards static overload

This test is only applicable to extensions with stops in the open position.

Apply the horizontal force (see [Figure 5](#)) specified in [Annex C](#) to the force application point of the extension element.

The extension element or its parts shall not become detached.

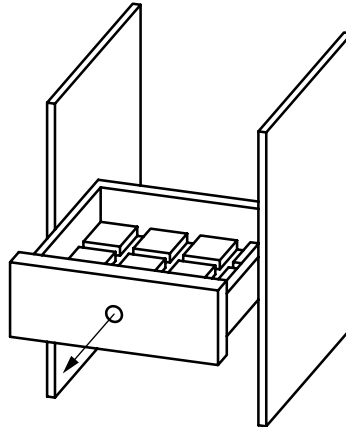


Figure 5 — Outwards static overload

6.2.5 Slam-shut/open

Place the extension element on its runners and load it in accordance with the loading capacity (M). The load shall be marbles ([5.3](#)) or, when configured for pocket files, paper ([5.4](#)) as shown in [Figure 1](#).

Open the extension element 300 mm, or fully open it if it cannot be opened 300 mm. Extension elements without stops in the open position shall be opened until 100 mm remains inside the test frame.

Slam the extension element shut 10 times (see [Figure B.1](#)) using the apparatus specified in [Annex B](#) (see [Figure B.1](#)) and factor K specified in [Annex C](#).

The slamming force shall act until 10 mm before the extension element reaches its end travel.

Apply the force to the force application point (see [Figure 2](#)).

Carry out the slam open test (see [Figure B.2](#)) in accordance with the same principle as above, if the extension element is fitted with stops in the open position.

The extension element or its parts shall not become detached.

6.3 Functional tests

6.3.1 General

During testing according to [6.3](#), the extension element shall be uniformly loaded in accordance with the loading capacity (M). The load shall be masses ([5.3](#)) unless otherwise specified.

6.3.2 Deflection of extension element bottoms

This test is only applicable to extensions which include a bottom.

Determine the lowest point of the unloaded bottom.

Load the bottom in accordance with [6.3](#) (see [Figure 6](#)).

After 15 min, determine the lowest point of the loaded bottom and record the deflection.

The deflection shall not exceed 1/75 of the shortest inner dimension (width or depth).

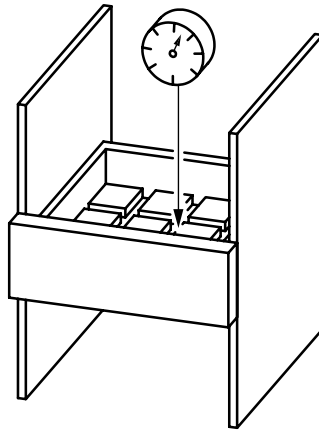


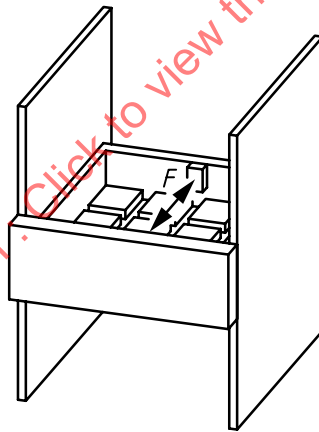
Figure 6 — Load on bottom surface

6.3.3 Deformation of front and back

This test is only applicable to extension element systems which include front and back.

Apply a static force $\frac{2}{3}$ of the loading capacity but not more than the force specified in [Annex C](#). The force shall be applied $\frac{2}{3}$ down from the top of the lowest element [front or back] and at the middle of the width of the front and back (see [Figure 7](#)) by using the 50 mm loading pad ([5.5](#)).

During the test, the bottom shall not fall out or become detached and after testing, the extension element shall fulfil its function.



Key

F force

Figure 7 — Load on front and back

6.3.4 Operating forces

The maximum forces for opening and closing, including the forces of catches, dampers, self-opening and self-closing mechanisms, shall be measured before the first vertical downwards static load test ([6.3.5](#)) and after the second horizontal sideways static test ([6.3.11](#)).

The force application point shall be as shown in [Figure 2](#).

The measuring direction shall be perpendicular to the front and parallel to the extension direction.

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

In the case of extension elements with stops in the open position, the determination of the maximum opening force shall be carried out from the fully closed position to 10 mm before the fully open position. When there are no stops in the open position, the determination shall be carried out to the point at which 2/3 of the inside length [depth] of the extension element or at least 100 mm remains inside the test frame.

In the case of extension elements with stops in the open position, the determination of the maximum closing force shall cover the range from the point where the extension is 50 mm from fully open to fully closed position. When there are no stops in the open position, the determination shall be carried out from the point at which 2/3 of the inside length [depth] of the extension element or at least 100 mm remains inside the test frame.

When the loading capacity is less than 40 kg, the opening and closing forces determined shall not exceed 50 N.

When the loading capacity is ≥ 40 kg, the opening and closing forces determined shall not exceed 12,5 % of the loading capacity.

6.3.5 First vertical downwards static load test

Open the extension element to its open stops or if there are no open stops to the point at which one-third of the inside length (depth) of the extension element, or at least 100 mm, remains inside the test frame.

Apply through the loading pad (5.5) a vertical static force equal to 50 % of the loading capacity but not higher than the maximum force specified in Annex C on one top corner of the extension element front (Figure 3).

Carry out the test five times.

The extension element shall fulfil its function.

6.3.6 First horizontal sideways static load

Open the extension element to its open stops or if there are no open stops to the point at which one-third of the inside length (depth) of the extension element, or at least 100 mm, remains inside the test frame.

Apply through the loading pad (5.5) a horizontal force equal to 25 % of the loading capacity but not higher than the maximum force specified in Annex C to the centre of the side of the front (see Figure 4).

Carry out the test five times.

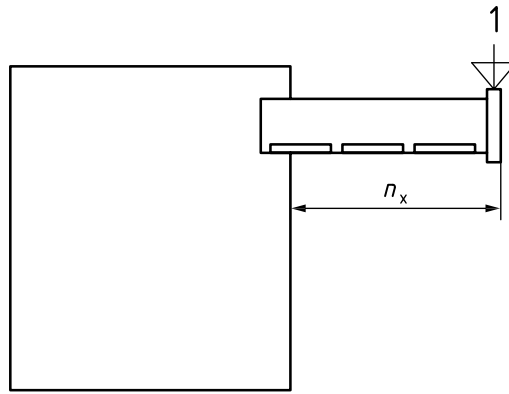
Repeat the test five times in the opposite direction of the front (see Figure 4).

The extension element shall fulfil its function.

6.3.7 Determination of reference point for the deflection of front

Before the durability test, fully open the unloaded extension. If there are no open stops, open it to the point at which one-third of the inside length (depth) of the extension element, or at least 100 mm, remains inside the test frame.

The vertical position at the middle of the top of the front shall be recorded as the reference point for the measurement of the deflection in 6.3.9 (see Figure 8) with an accuracy of 0,1 mm.

**Key**

1 deflection measuring point

 n_x extension length**Figure 8 — Deflection of front****6.3.8 Durability**

If the extension element is configured for pocket files, the load shall be as per (5.5) as shown in Figure 1.

Open and close the extension element (see Figure 9) gently and without supporting the front for the number of cycles specified in Annex C.

Open from the fully closed position to the point at which one-third of the inside length (depth) of the extension element, or at least 100 mm, remains inside the test frame (Figure 9). For extension elements, which are equipped with any sort of built-in stop in the open position, fully open the extension element without forcing the stop.

If the extension element has a damper and/or a catch device, including a self-opening or a self-closing mechanism, this shall be allowed to operate at each cycle.

NOTE If the extension element has a damper and/or a catch device, the speed, v , at the beginning of the self-closing or catch operation can be

$$v = \frac{35}{95 + M}$$

where M is the loading capacity.

Open and close the extension element via the force application point at a rate of 4 to 15 cycles per minute.

The average speed shall not exceed 0,25 m/s.

The extension element shall fulfil its function.

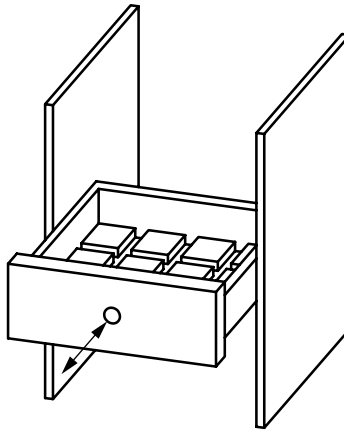


Figure 9 — Durability test

6.3.9 Deflection of front

The deflection of the loaded extension element shall be measured in accordance with [6.3.7](#).

The deflection shall not exceed 4 % of the extension length, n_x (see [Figure 8](#)). If there are no open stops, the extension length is to the point at which one-third of the inside length (depth) of the extension element, or at least 100 mm, remains inside the test frame.

6.3.10 Second vertical downwards static load

Open the extension element to its open stops or if there are no open stops to the point at which one-third of the inside length (depth) of the extension element, or at least 100 mm, remains inside the test frame.

Apply a vertical static force equal to 50 % of the loading capacity but not higher than the maximum force specified in [Annex C](#) on one top corner of the extension element front (see [Figure 3](#)).

Carry out the test five times.

The extension element shall fulfil its function.

The deflection under load shall be recorded as specified in [6.3.7](#).

6.3.11 Second horizontal sideways static load

Open the extension element to its open stops or if there are no open stops to the point at which one-third of the inside length (depth) of the extension element, or at least 100 mm, remains inside the test frame (see [Figure 4](#)).

Apply a horizontal force equal to 25 % of the loading capacity but not higher than the maximum force specified in [Annex C](#) to the centre of the side of the front (see [Figure 4](#)).

Carry out the test five times.

Repeat the test five times in the opposite direction of the front (see [Figure 4](#)).

The extension element shall fulfil its function.

6.3.12 Operating forces

The maximum forces for opening and closing shall be determined as specified in [6.3.4](#).

When the loading capacity is less than 40 kg, the opening and closing forces determined shall not exceed 50 N.

When the loading capacity is ≥ 40 kg, the opening and closing forces determined shall not exceed 12,5 % of the loading capacity.

6.3.13 Slam-shut/open

Slam shut/open tests shall be carried out as specified in [6.2.5](#).

The extension element shall fulfil its function.

6.4 Corrosion resistance

The corrosion test shall be carried out when required on the third set of extensions in accordance with ISO 6270-2.

The test method shall be 72 h (3 cycles) condensation water test with alternating humidity and air temperature in accordance with ISO 6270-2 (alternating humidity test).

With the exception of cutting edges, screw slots, rivet heads, aluminium and moulded parts of zinc, all parts, which are visible when the extension is mounted shall fulfil $R_p \geq 8$ in accordance with corrosion information in ISO 10289.

6.5 Test report

The test report shall include at least the following information:

- a) reference to this document (i.e. ISO 12808:2024);
- b) detailed description of the extension tested, including the weight of the extensions;
- c) any defects observed before testing;
- d) test results in accordance with [6.2.2](#) to [6.4](#);
- e) details to be included in the product information, as indicated in [Annex A](#);
- f) load and test rate used for the durability test;
- g) details of any deviations from this document;
- 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 extension elements for a given purpose. Therefore, information shall be given by the manufacturer of the extension elements 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 extension elements are suitable, e.g. solid wood, particle board.

The product information shall include information regarding the test level (see [Tables C.1](#) and [C.2](#)) and test results.

A.3 Loading capacity

The product information shall include the mass, M , expressed in kilograms, for which the extension element will fulfil the requirements of this document.

A.4 Open stops

The product information shall include information regarding the provision of end stops in the open position.

A.5 Maximum height of the front

The product information shall include information on the maximum height of the front.

A.6 Corrosion test

The product information shall include the results of the corrosion test.

A.7 Other information

Other information regarding the test results, for example, the deflection of front and the deflection of bottom, shall be available on request.