
**Furniture — Storage units — Test
methods for the determination of
strength, durability and stability**

*Ameublement — Éléments de rangement — Méthodes d'essai pour la
détermination de la résistance, de la durabilité et de la stabilité*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 7170:2005), which has been technically revised, and ISO 7171:2019, which has been merged into this document.

The main changes compared to the previous edition are as follows:

- addition of the Introduction;
- normative reference ISO 48-5:2018 replaces ISO 7619-2:2010;
- deletion of the pneumatic slamming apparatus for slam open and slam shut tests of extension elements;
- introduction of sideward detachment tests for units mounted to the building or other structure;
- introduction of a stability test for units with doors, extension elements and flaps, opened and unlocked with storage areas partly loaded;
- introduction of definitions, figures and additional a stability test method for units intended to support a TV-set;
- revision of the guidance for the choice of loads, cycles, etc. for strength, durability and stability testing in [Annex A](#);
- loads and forces for different applications have been merged in [Annex B](#).

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

This document has been developed with the objective of promoting relevant test methods for determining the strength, durability and stability of storage furniture, simulating normal functional use, as well as foreseeable misuse, that might reasonably be expected to occur. The tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes and intended to demonstrate the ability of the item to give satisfactory service in its intended environment.

The test results are only valid for the unit/component tested. These results can be used to represent the performance of production models prior to use, provided that the tested unit/component is representative of the production model. Only when properly justified, they can be used for failure analysis of a unit that has been in use.

The strength and durability tests do not assess the structure of the building, e.g. the strength of wall hanging cabinets includes only the cabinet and the parts used for the attachment. The wall and the attachment into the wall are not included.

Assessment of ageing and environmental degradation is not included.

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Furniture — Storage units — Test methods for the determination of strength, durability and stability

1 Scope

This document specifies test methods for determining the strength, durability and stability of storage units, when fully assembled prior to use, including their movable and non-movable parts.

Acceptance criteria for the strength, durability and stability of the storage furniture is not specified by the test methods. Instead, suggested loads, cycles and forces are provided in [Annex B](#), depending on the applicability of the furniture.

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 48-5:2018, *Rubber, vulcanized or thermoplastic — Determination of hardness — Part 5: Indentation hardness by IRHD pocket meter method*

3 Terms and definitions

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

ISO and IEC maintain terminological 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

adjustable friction stay

component (3.7) to hold open a door or a *flap* (3.13) with a feature that keeps the door or flap open without any further assistance at a multitude of positions

3.2

bracket

rigid device to prevent overturning

Note 1 to entry: Normally made of metal; not a flexible device such as strap or cable tie.

3.3

built-in stop

device of the *component* (3.7) that limits the travel of *extension element* (3.12) or doors

3.4

catch device

device that keeps or pulls a *component* (3.7) in place but does not require a second action in order to release it

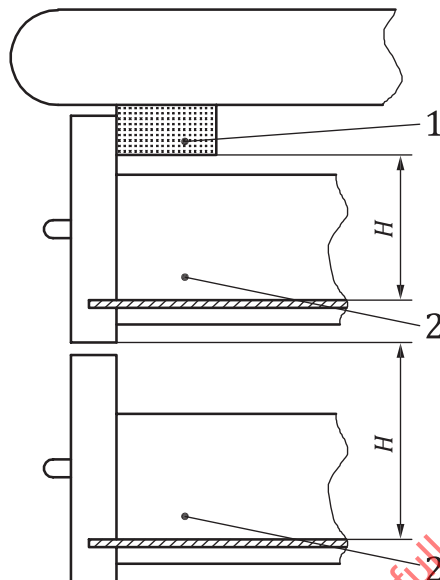
EXAMPLE A magnetic catch or a self-closing-mechanism.

3.5

clear height

unobstructed height above the top of the bottom surface, or the structure of the *unit* (3.27)

Note 1 to entry: For example, the top of the *extension element* (3.12) below and the lower edge of the extension element above (see Figure 1).



Key

- 1 structure of the unit
- 2 extension element
- H clear height

Figure 1 — Clear height

3.6

coat hook

component (3.7) to support an outer garment

3.7

component

part of a *unit* (3.27) including hardware, e.g. *extension element* (3.12), door and *flap* (3.13)

3.8

configuration

arrangement of *components* (3.7) in a particular figure, form or combination

3.9

damper mechanism

mechanism that gently brings the *component* (3.7) to a stop

3.10

distance device

device intended to keep an item of wall-mounted furniture vertical

3.11

excessive heating

result of repeated friction such that a *component* (3.7) is adversely compromised

3.12**extension element**

component (3.7) that can be pulled out and pushed in

EXAMPLE Drawers, suspended pocket files, keyboard *tray* (3.25).

3.13**flap**

horizontally hinged door, which opens upwards or downwards

3.14**free-standing unit**

unit (3.27) not intended to be attached to a load bearing structure

3.15**height adjustment device**

adjustable device intended to enable height adjustment of a *unit* (3.27), such as a work surface

3.16**interlock**

device that restrains the opening of more than one *extension element* (3.12) at a time

3.17**latching mechanism**

mechanism that retains an *extension element* (3.12) or a door in the closed position and that requires a second action to release it and can require a key or a combination in order to activate it

3.18**levelling device**

adjustable device intended to keep an item of furniture horizontal with a limitation of 40 mm of vertical range

EXAMPLE Adjustable feet or similar.

3.19**locking mechanism**

mechanism that limits access to the interior of a *unit* (3.27) or a storage element and that requires a key or a combination in order to activate it or to make it possible to activate it

3.20**overturn**

condition where an unrestricted storage *unit* (3.27) does not return to its upright normal position

3.21**runners**

component (3.7) that is used to facilitate the movement of an *extension element* (3.12)

Note 1 to entry: Includes smooth surfaces, roller and ball bearing slides.

3.22**self-locking stay**

component (3.7) to hold open a door or a *flap* (3.13) with a feature that keeps the door or flap open without any further assistance

3.23**structural member**

component (3.7) to enhance the strength of the assembled *unit* (3.27)

3.24**suspended filing pockets**

extension element (3.12) usually without a bottom such that contents are suspended by a frame

3.25

tray

storage element that is designed, under normal use, to be removed from the storage *unit* (3.27) and used independently

3.26

TV-furniture

unit (3.27) intended to, or marketed for, supporting a monitor, TV set or similar item

3.27

unit

complete furniture intended to be tested

EXAMPLE Bookcases, wardrobes, cabinets, wall-mounted or exterior-mounted elements, free-standing and mobile pedestals, lateral and vertical files.

3.28

wall attachment device

device including the component that is attached to the cabinet and the component that is attached to the wall

Note 1 to entry: A component that is attached to the cabinet is, for example, a suspension *bracket* (3.2).

Note 2 to entry: A component that is attached to the wall is, for example, a hook, a rail.

3.29

worst case

condition most likely to cause failure, e.g. the *configuration* (3.8) of a *unit* (3.27) most likely to cause it to *overturn* (3.20)

4 General test conditions

4.1 Preliminary preparation

The unit(s)/component(s) shall be tested as delivered. The unit(s)/component(s) shall be assembled and/or configured according to the instructions supplied. Unless otherwise stated, the most adverse configuration (3.8) shall be used for each test. If mounting or assembly instructions are not supplied, 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 needs to be changed in order to produce the worst-case (3.26) conditions, this shall be recorded in the test report.

During testing, the unit shall be placed on the floor and levelled, unless otherwise specified. The levelling device (3.18) shall be set to the mid position but not more than 13 mm from fully closed.

A combination of tests can be necessary to cover the properties of multifunction components (e.g. a receding door shall be tested both as a sliding door and as a pivoted door).

Unless otherwise specified by the manufacturer, the sample for test shall be stored in indoor ambient conditions for at least 24 h immediately prior to testing.

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.

In addition, the test for deflection of shelves (6.1.4) and sustained load tests (6.2.1) except metal, stone and glass shelves, shall be carried out at a relative humidity of 45 % to 55 %. If during a test the relative humidity is outside this range, the maximum and/or minimum shall be recorded in the test report.

If a test cannot be carried out as specified (e.g. because a loading pad cannot be used for the application of a force due to the design of a product), the test shall be carried out as closely as possible to that specified.

Before beginning the testing, visually inspect the unit thoroughly. Record any defects so that they are not assumed to have been caused by the tests. Carry out measurements, if specified.

It is not necessary that all tests be carried out on the same unit, but all tests specified for a particular component shall be carried out on the same component.

In [Annex C](#), rationale for selected test methods is provided.

4.2 Application of forces

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

The test forces in durability tests shall be applied at a rate to ensure that excessive heating ([3.11](#)) does not occur. Unless otherwise specified, each test force shall be maintained for (2 ± 1) s.

Forces shall be applied in a manner that ensures normal functioning of self-closing and damping mechanisms. The forces can be replaced by masses. The relationship $10 \text{ N} = 1 \text{ kg}$ shall be used.

In [Annex B](#), loads, forces and cycles are suggested to ensure that the test methods are of use where no requirements document is available, or to assist in the development of one. See also [Annex A](#) for guidance to develop requirements documents.

4.3 Tolerances

Unless otherwise stated, the following tolerances are applicable to the test equipment:

- forces: $\pm 5 \%$ of the nominal force;
- velocities: $\pm 10 \%$ of the nominal velocity;
- masses: $\pm 1 \%$ of the nominal mass;
- dimensions: all dimensions less than 200 mm shall have an accuracy of $\pm 1 \text{ mm}$ of the nominal dimension; the other dimensions shall have an accuracy of $\pm 0,5 \%$; the dimension of the spherical curvature of 300 mm radius on the loading pad ([5.5](#)) shall have an accuracy of $\pm 5 \text{ mm}$;
- angles: $\pm 2^\circ$ of the nominal angles.

The accuracy for the positioning of loading pads shall be $\pm 5 \text{ mm}$.

Test forces, masses, dimensions, velocities and angles used to perform the test shall be targeted at the nominal values specified and shall be subjected to the above tolerances.

NOTE For the purposes of uncertainty measurement, test results are not considered to be adversely affected when the above tolerances are met.

4.4 Prevention of movement during test

If a free-standing unit ([3.14](#)) tends to overbalance during the tests specified in [Clauses 6](#) and [7](#), load the unit until this tendency stops, unless otherwise specified.

If a free-standing unit tends to slide during the tests specified in [Clauses 6](#) and [7](#), with the exception of [6.4.2](#) and [6.4.3](#), the unit shall be restrained by stops ([5.4](#)).

4.5 Loading

Unless otherwise specified, for strength and durability tests, all storage components that are not subject to testing shall be uniformly loaded according to [Table 1](#).

Table 1 — Loads for strength and durability tests

Component	Load
All horizontal storage areas, including shelves, bottoms, tops and flaps	0,65 kg/dm ²
Extension element (3.12), tray (3.25) and baskets	0,2 kg/dm ³
Suspended filing pockets (3.24)	^a 1,5 kg/dm
Clothes rails	2 kg/dm
Storage area/-volume for heavy appliances (e.g. refrigerator, washing machine)	^b 0,5 kg/dm ³
^a Measured perpendicular to the plane of the filing pockets.	
^b Maximum load 200 kg per unit.	

Unless otherwise specified, for stability tests, all storage components shall be uniformly loaded with the specified load(s) according to [Table 2](#).

Table 2 — Loads for stability tests

Component	Load
All horizontal storage areas, including shelves, bottoms, tops and flaps	0,325 kg/dm ²
Extension elements, trays and baskets with clear height (3.5), $H \leq 1$ dm	0,2 kg/dm ³
Extension elements, trays and baskets with clear height (3.5), H between 1 dm and 2,5 dm (H in dm)	$(0,2667 - 0,0667H)$ kg/dm ³
Extension elements, trays and baskets with clear height (3.5), $H \geq 2,5$ dm	0,1 kg/dm ³
Suspended filing pockets (3.24)	^a 1,25 kg/dm
Clothes rails	2 kg/dm
Storage area/-volume for heavy appliances (e.g. refrigerator, washing machine)	^b 0,5 kg/dm ³
^a Measured perpendicular to the plane of the filing pockets.	
^b Maximum load 100 kg per unit.	

5 Test equipment and apparatus

5.1 Unless otherwise specified, the tests can be applied by any suitable device, because results are dependent only upon correctly applied forces and not on the apparatus.

The equipment shall not inhibit deformation of the unit/component, i.e. it shall be able to move so that it can follow the deformation of the unit/component during testing, so that the loads are always applied at the specified points and in the specified directions.

5.2 Floor surface, a rigid, horizontal and flat surface.

5.3 Wall surface, shall be rigid, vertical and flat.

5.4 Stops, devices to prevent the article from sliding but not tilting, not higher than 12 mm, except in cases where the design of the unit necessitates the use of higher stops, in which case the lowest stop that prevents the item from moving shall be used. For stability tests, the lowest height that prevents the item from moving shall be used.

5.5 Loading pad, a rigid disc 100 mm in diameter, with a flat face and a 12 mm front edge blend radius. Where space prevents the use of a 100 mm diameter loading pad, a 50 mm diameter loading pad with similar properties can be used.

5.6 Apparatus for slam shut/open of extension elements, as given in [Annex D](#).

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

NOTE For the deflection of shelves ([6.1.4](#)), steel masses with a mass of 1 000 g and with a length of 85 mm, a width of 50 mm, and a thickness of 30 mm are suitable.

5.8 Spherical objects, such as glass marbles with 10 mm to 15 mm diameter. They shall be loosely packed 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.

5.9 Loads for suspended filing pockets ([3.24](#)), shall be loaded with paper or an equivalent alternative as shown in [Figure 21](#).

5.10 Steel impact plates, 200 mm in length, with one surface faced with a 3 mm thick layer of rubber with a hardness of (85 ± 10) IRHD according to ISO 48-5:2018. Other properties of steel impact plates are as defined in [Table 3](#).

Table 3 — Steel impact plates

Plate parameter	Unit	Plate no. 1	Plate no. 2
Mass (excluding rubber)	kg	1,7	2,5
Approximate width	mm	109	160
Approximate thickness	mm	10	10
Length	mm	200	200

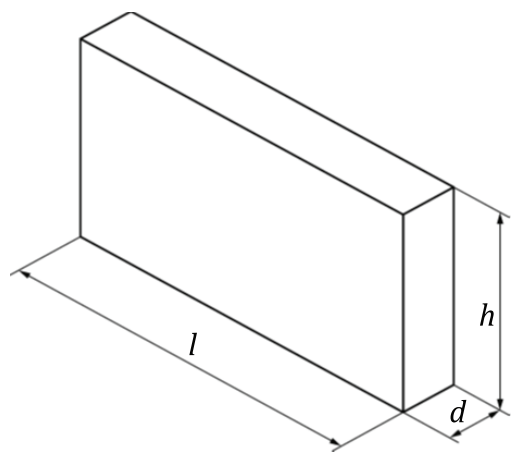
5.11 Obstacles for castor durability tests, use two steel strips 50 mm wide and 2 mm high with the edges having a radius of 2 mm, 500 mm apart and parallel on the floor surface and perpendicular to the test direction.

5.12 TV Template, two templates constructed as frame or box as shown in [Figure 2](#), with dimensions as defined in [Table 4](#), able to support a load acting through the centre of gravity of the TV template. The weight of the unloaded template shall be $(10 \pm 0,2)$ kg.

The centre of gravity of the unloaded template shall be the geometric centre of the unloaded template.

When a load is added to the template, the variation of the position of the centre of gravity to that of the unloaded template shall be restricted to 5 mm.

When testing, the template shall remain in its initial position.



Key
l length
h height
d depth

Figure 2 — TV template

Table 4 — TV template dimensions

Parameter	TV template 1	TV template 2
length (mm)	710 ± 2	1 100 ± 2
height (mm)	400 ± 2	620 ± 2
depth (mm)	65 ± 10	65 ± 10

6 Test procedures for non-movable parts

6.1 Shelves

6.1.1 General

For units with an indeterminate number of shelves, unless otherwise specified, divide the internal height of the unit, in millimetres, by 200 and take the nearest integer. This number, minus one, shall then be the number of shelves to be fitted.

The number of shelves (*N*) that shall be fitted is calculated by the following formula:

$$N = \text{integer of } (h/200) - 1$$

where *h* is the internal height of the unit.

6.1.2 Shelf retention test — Horizontal outward force

This test is only applicable to shelves that are movable within the unit.

Apply the horizontal outward force specified to the middle of the front edge of the shelf.

6.1.3 Shelf retention test — Vertical downward force

This test is only applicable to shelves that are not fixed.

By means of a 50 mm diameter loading pad (5.5), apply the vertical downward force specified to a point 25 mm from the front edge of the shelf at the position most likely to cause failure.

6.1.4 Deflection of shelves

Testing of the deflection of shelves, which are not made of metal, glass or stone, shall be carried out in a controlled humidity atmosphere (4.1).

Place the shelf on its supports in the unit.

The deflection of the shelf shall be measured at a point 10 mm from the front edge where the deflection is greatest.

The deflection shall be measured to an accuracy of $\pm 0,1$ mm with reference to a straight line parallel to the front edge drawn between two adjacent supports.

Load the shelf uniformly (see Figure 3) with the load specified and apply for

- one hour for shelves made of metal, glass and stone, and
- one week for all other shelves.

At the same points as specified above, measure and record the deflection under load to an accuracy of $\pm 0,1$ mm and as a percentage of the distance between the supports.

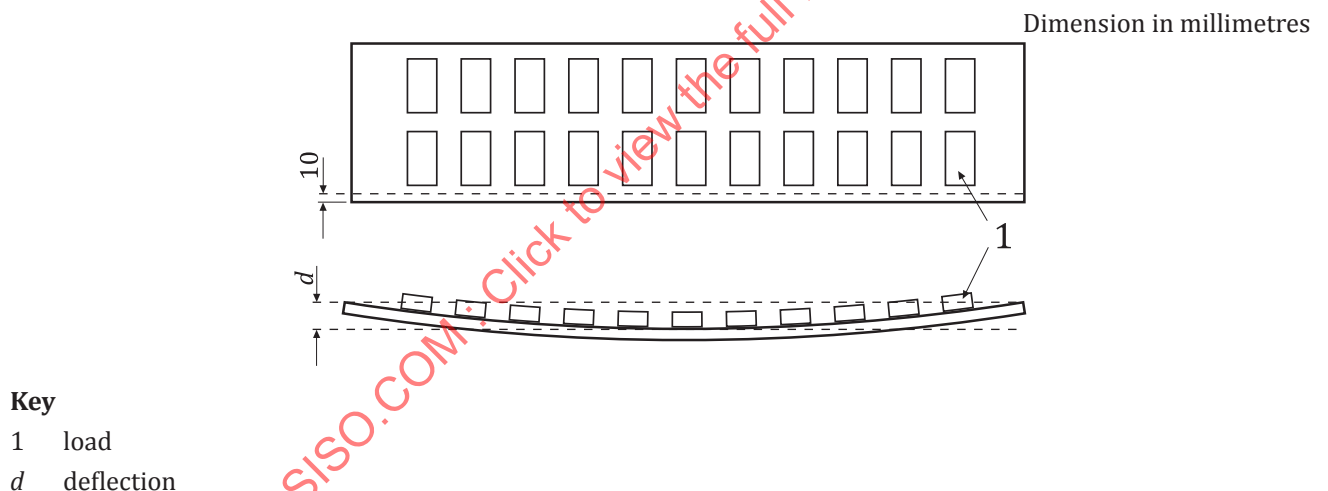


Figure 3 — Deflection test of shelves

6.1.5 Strength of shelf supports

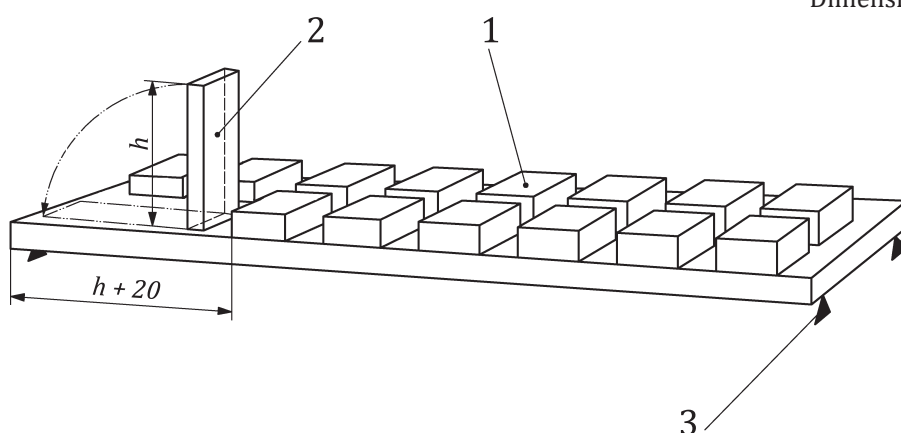
Load the shelf uniformly with half the load specified for the deflection of shelf test (6.1.4), except at 220 mm from one support, where the impact plate (5.10) shall be tipped over 10 times over the support (see Figure 4). The striking surface of the impact plate (5.10) shall be that faced with rubber. All supports of the shelf shall be tested.

If the clear height (3.5) is less than 205 mm, the test is not carried out.

This test is not applicable to shelves, tops and bottoms that are fully supported by the structure of the unit or have a length of less than 230 mm.

This test shall be carried out on all horizontal surface (e.g. shelves, tops and bottoms that can be used as storage area).

Dimensions in millimetres

**Key**

- 1 load
- 2 steel impact plate
- 3 shelf support
- h length of impact plate

Figure 4 — Strength test of shelf support**6.2 Tops and bottoms****6.2.1 Sustained load test for tops and bottoms**

This test is applicable to all tops and bottoms that are not completely supported by the floor during use.

The sustained load test shall be carried out in a humidity-controlled atmosphere (4.1).

The deflection of the top or bottom shall be measured where it is greatest.

The deflection shall be measured and recorded with reference to a straight line drawn between two adjacent supports to an accuracy of $\pm 0,1$ mm and as a percentage of the distance between the supports.

Load all components intended for storage purposes, with the specified load(s) in Table 1.

Load the top or bottom uniformly (see Figure 5) with the load specified and apply for

- one hour for tops and bottoms made of metal, glass and stone; review on enquiry, and
- one week for all other tops and bottoms.

Measure and record the deflection under load as specified above.

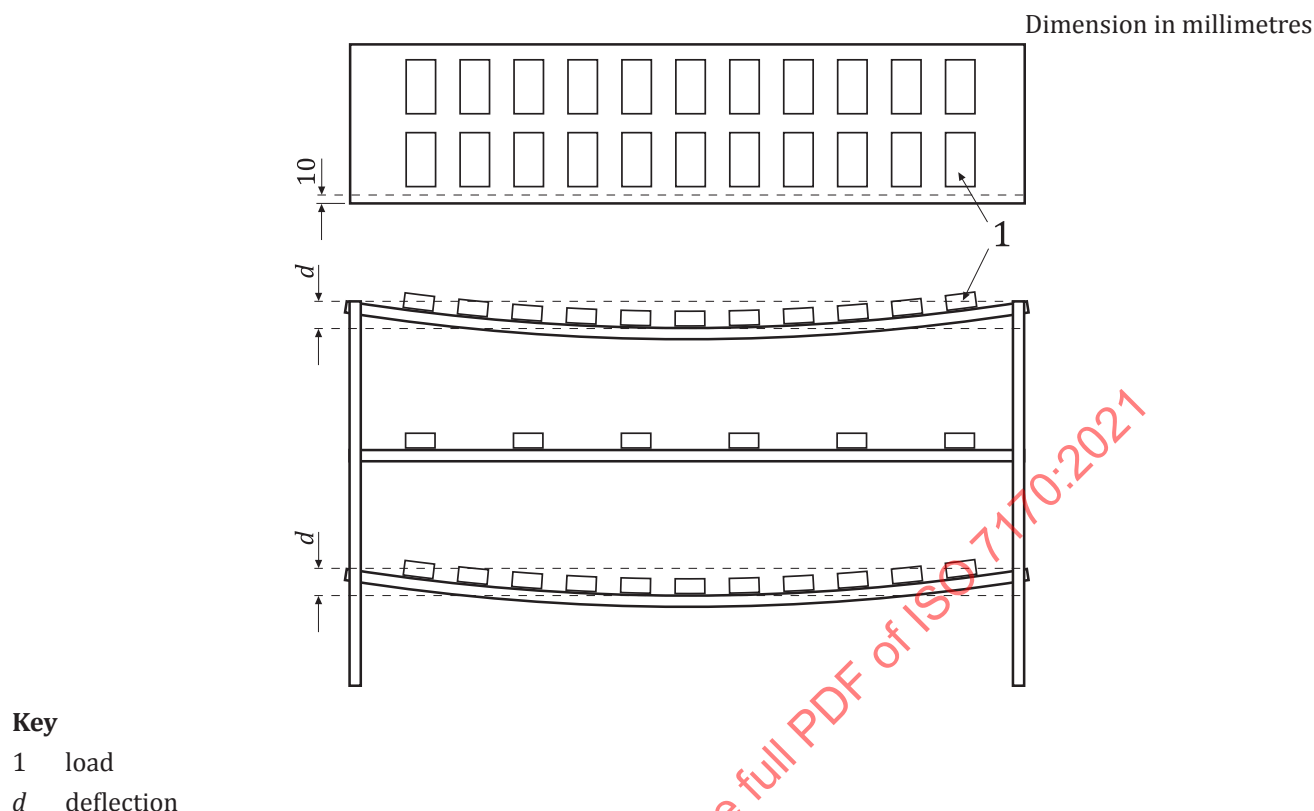


Figure 5 — Sustained load — Deflection test of shelves

6.2.2 Static load test for tops and bottoms

This test is only applicable to tops that are $\leq 1\,000$ mm from the floor and to bottoms that are not completely supported by the floor during use where the clear height (3.5) is 1 600 mm or more.

Load all components intended for storage purposes, with the specified load(s) in Table 1. Apply through the loading pad (5.5) the specified vertical downward force 10 times at the worst-case position but not less than 50 mm from the edges.

Record the loading point.

6.3 Clothes rails and supports

6.3.1 Strength of supports

When clothes rails are structurally interconnected, all the clothes rails shall be loaded.

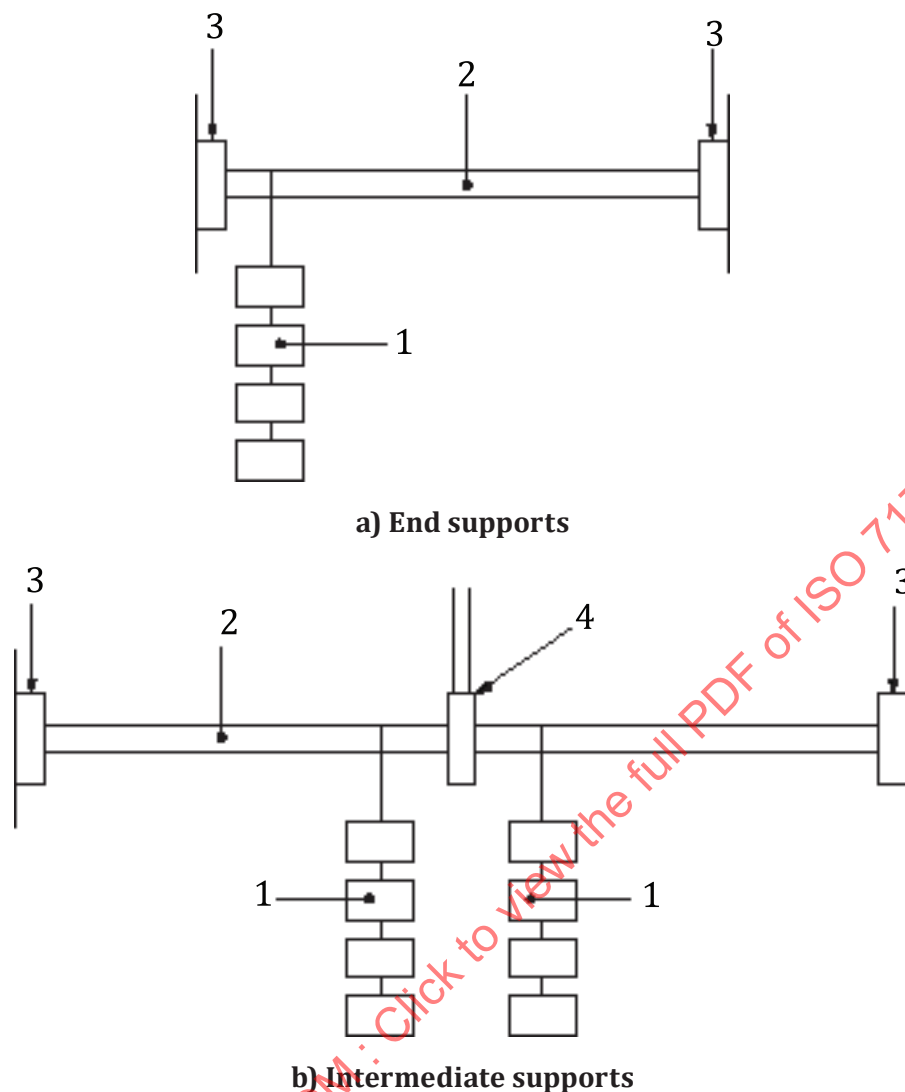
The span of a clothes rail is the distance between consecutive supports.

Place the rail on its supports in the unit.

Load all components intended for storage purposes, with the specified load(s) in Table 1.

Each support shall be loaded consecutively. End supports shall be loaded with the specified load placed as close as possible to the support. Intermediate supports shall be loaded with double the specified load placed as close as possible to the support (see Figure 6).

The force shall be applied for 1 h.



Key

- 1 load
- 2 clothes rails
- 3 end support
- 4 intermediate support

Figure 6 — Strength and test of clothes rail supports

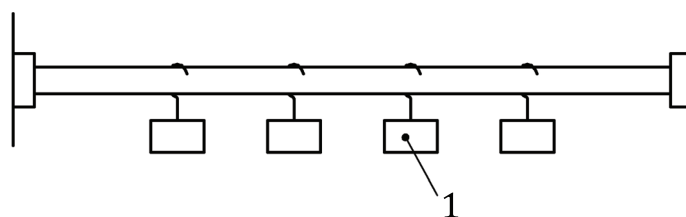
6.3.2 Strength of clothes rails

Place the rail on its supports in the unit.

Load all parts components for storage purposes, with the specified load(s) in [Table 1](#)

Load the rail uniformly with the load specified (see [Figure 7](#)) and apply for

- one hour for metal rails, and
- one week for all other rails.

**Key**

1 load

Figure 7 — Strength of clothes rail**6.4 Strength of the structure****6.4.1 Test for structure, underframe and/or legs**

This test is not applicable to units attached to a wall, ceiling, floor or another unit.

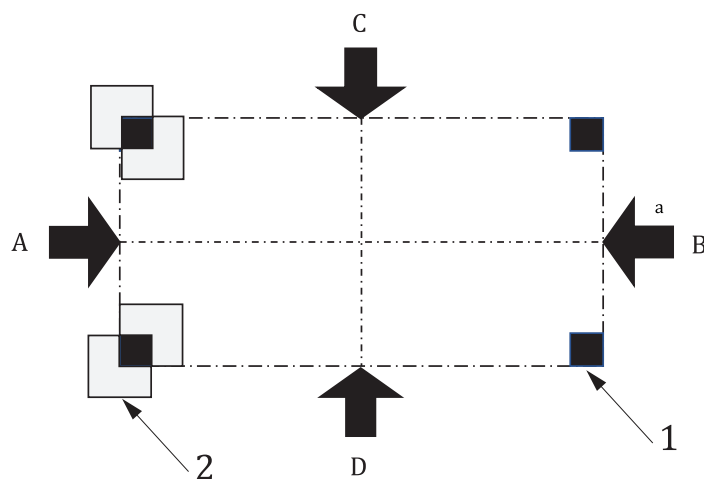
Place stops around the legs or base [see [Figures 8a](#)] and [8b](#)].

Load all components intended for storage purposes, including tops, with the specified load(s) in [Table 1](#). Close extension elements, flaps, roll fronts and doors.

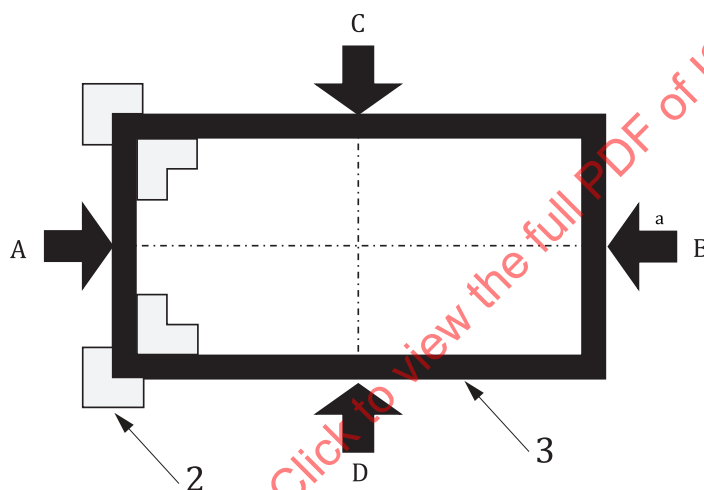
Apply, by means of the loading pad ([5.5](#)), the static force specified 10 times [see [Figures 8a](#)] and [8b](#)] at point A, on the centre line of the side of the unit 50 mm from the highest point at that position, but not higher than 1 600 mm from the floor (see [Figure 9](#)). If no structural member ([3.23](#)) exists at this position, apply the load by means of a rigid bar.

Repeat this procedure 10 times at points B, C and D.

If the unit tends to tilt, lower the application point until tilting is just prevented. If this point is lower than 300 mm and the unit is still tipping, the test procedure is not applicable in that direction. Record the height.



a) Example — Storage unit with legs



b) Example — Storage unit with base

Key

- 1 leg
- 2 stops
- 3 base

A,B,C,D force application points

a Force direction

Figure 8 — Strength test of structure and underframe — Force application points and directions

Dimension in millimetres

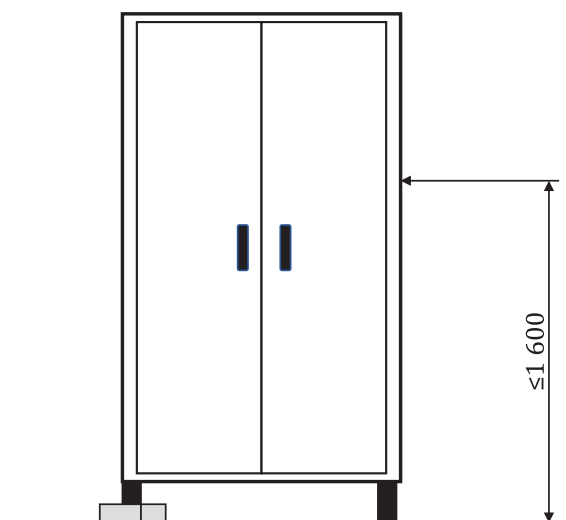


Figure 9 — Strength test of structure and underframe — Force application points

6.4.2 Drop test

The unit shall be unloaded and all extension elements, flaps, roll fronts and doors shall be closed.

Measure the force (F) in N required to lift one end of the unit.

This test method is not applicable to units with the measured force > 700 N to lift any end.

Determine the drop height as a percentage of the specified nominal drop height as follows.

For forces (F) to lift the end of the unit, the drop height shall be:

- $F \leq 200$ N: 100 % of the specified nominal drop height;
- $F > 200$ N and ≤ 400 N: 50 % of the specified nominal drop height;
- $F > 400$ N: 30 % of the specified nominal drop height.

Lift the same end of the unit to the drop height and let it drop freely onto the floor surface (5.2). If the unit tends to overbalance at the specified drop height, lower the drop height to the point of equilibrium and record this in the test report.

Carry out the test once at each end. Height adjustable units shall be tested at the lowest position.

NOTE The front and back of the unit is not considered being the end.

6.4.3 Tests for units with castors or wheels

Load all components with the specified load(s) in Table 1.

At least one castor shall be run over obstacles (5.11) at a mean velocity of 0,2 m/s (± 20 %) for a distance of one meter. At the end of one meter, the direction of travel shall be reversed, and the castor shall return to the starting point. The procedure shall be repeated until the specified number of cycles has been completed. One cycle consists of one movement back and forth.

7 Test procedures for movable parts

7.1 Pivoted doors

7.1.1 General

This test applies to all doors hinged on the vertical side, including folding doors.

Mount stops around the legs or base in order to prevent the unit from moving on the floor during the tests.

Load all components intended for storage purposes, including tops and storage component on the door, with the specified load(s) in [Table 1](#).

7.1.2 Strength of pivoted doors — Vertical load

Load the door as shown in [Figure 10](#) with the mass specified. 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.

Move the door through the specified distance at a rate of 3 s to 5 s for opening and 3 s to 5 s for closing.

Dimension of millimetres

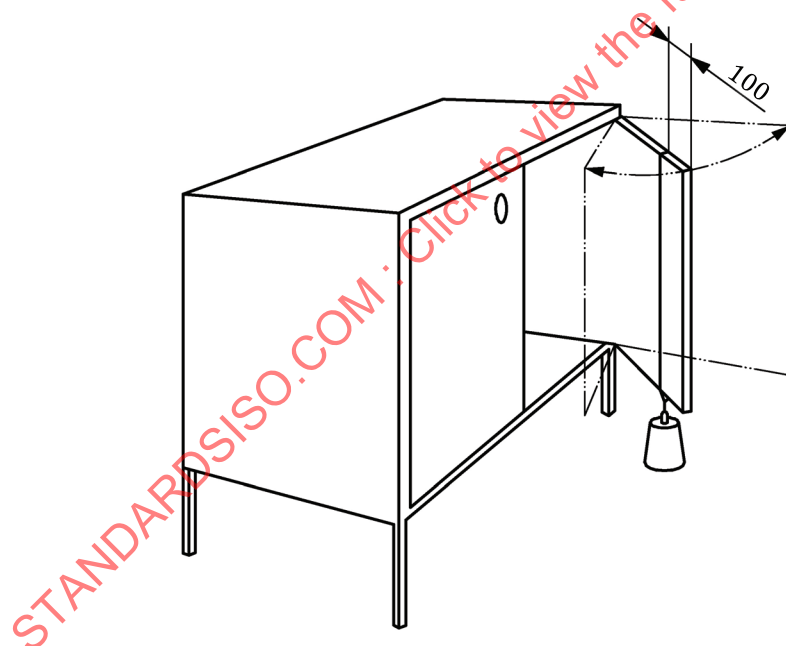


Figure 10 — Strength of pivoted doors — Vertical load

7.1.3 Strength of pivoted doors — Horizontal force

This test is not applicable to pivoted doors opening more than 135° .

Fully open the door. Apply the horizontal static force specified perpendicular to the plane of the door, at a point 100 mm from the outside edge furthest from the hinge halfway down the door (see [Figure 11](#)).

Apply the load 10 times.

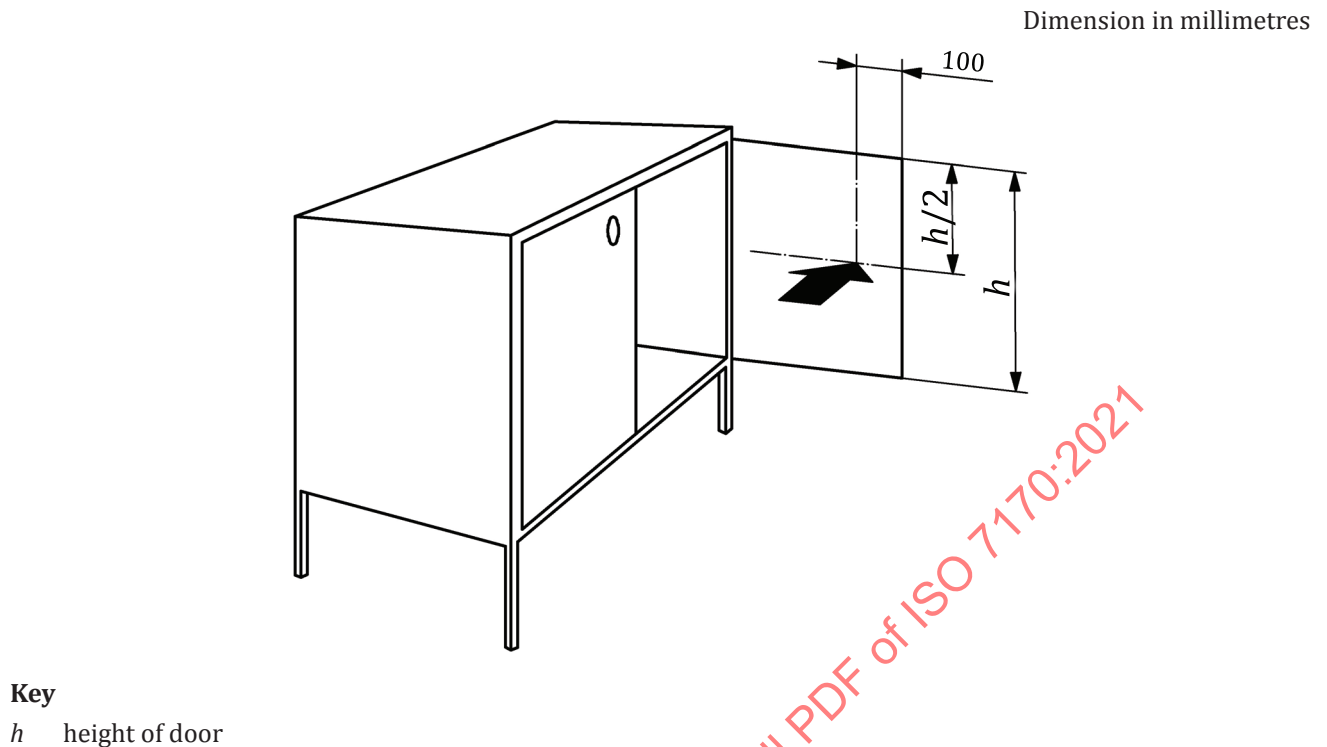


Figure 11 — Horizontal load test of pivoted doors

7.1.4 Slam shut of pivoted doors

The door shall be closed by means of a string or cord attached to the back of the door as close as possible to the position of the centre of the handle.

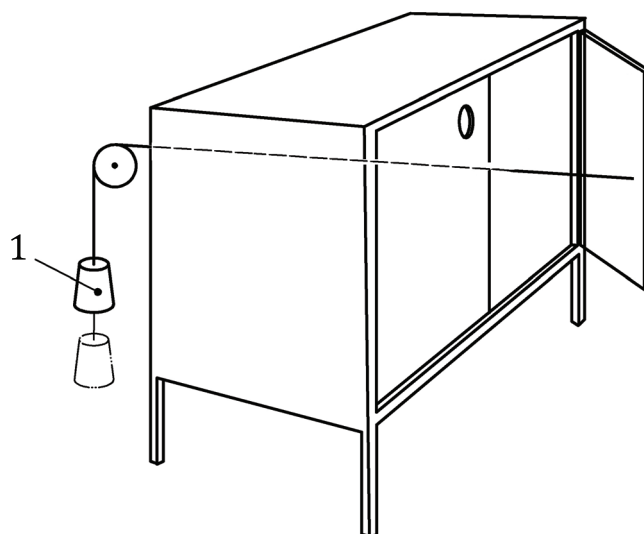
If the handle has a length greater than 200 mm, the string shall be attached 100 mm below the top of the handle up to a maximum height from the floor of 1 200 mm.

If the door has no handle, the string shall be attached 25 mm from the front edge (furthest from the hinge) at the middle of the door height.

The cord shall be perpendicular to the face of the door when it is fully closed and shall not change direction by an angle greater than 20° during movement.

Slam the door closed 10 times using the specified mass.

The test mass shall act until 10 mm from either fully closed position or before activation of any damping mechanisms. The mass shall fall through a distance of 300 mm or the distance required to close the door through 30°, whichever is the smaller (see [Figure 12](#)).



Key

1 mass (m_2)

Figure 12 — Slam shut test of pivoted doors

7.1.5 Durability of pivoted doors

Attach two masses, 1 kg each, one on each side of the door at the middle of the vertical centre line (see [Figure 13](#)).

Fully open the door to a maximum of 130° and close it, within 10mm from fully closed, for the number of cycles (back and forth) specified, without forcing built-in stop ([3.3](#)) in the open position. However, if the door has a damper, including a self-opening or self-closing mechanism, this shall be allowed to operate at each cycle.

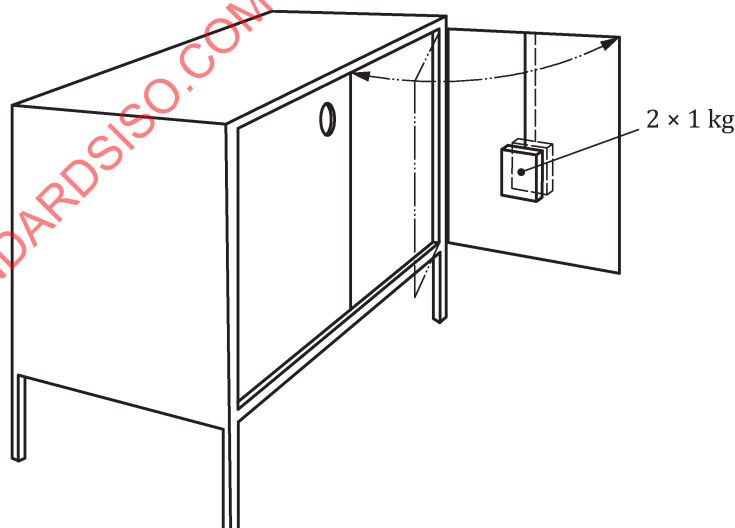


Figure 13 — Durability test of pivoted doors

The door shall be gently opened and closed at each cycle.

The maximum rate is 12 cycles per minute, if a pause is needed it shall be in the closed position.

7.2 Sliding doors and horizontal roll fronts

7.2.1 General

This test applies to all doors sliding horizontally, including those constructed from hinged elements.

Mount stops around the legs or base in order to prevent the unit from moving on the floor during the tests.

Load all components intended for storage purposes, including tops, with the specified load(s) in [Table 1](#).

7.2.2 Slam shut/open of sliding doors and horizontal roll fronts

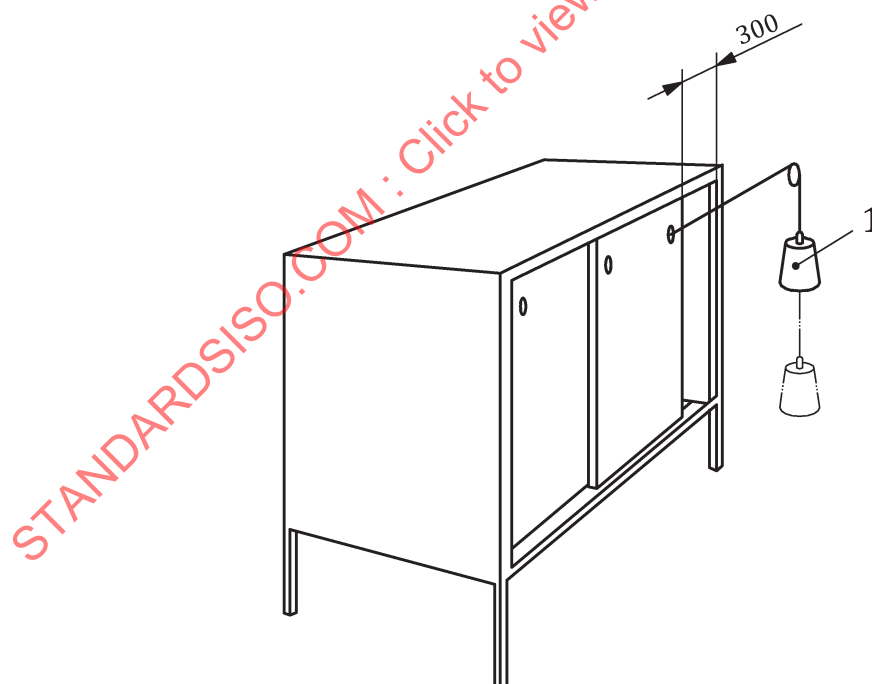
The door shall be opened/closed by means of a string or cord attached to the centre of the handle. If the handle has a length greater than 200 mm, the string shall be attached 100 mm below the top of the handle up to a maximum height from the floor of 1 200 mm. If the door has no handle, the string shall be attached at the middle of the door height.

Determine the mass, m_1 , required to just move the door. The test mass shall be m_1 plus a specified mass: m_2 .

Close/open the door/roll front 10 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 door/roll front is fully closed/opened (see [Figure 14](#)).

Dimensions in millimetres



Key

1 mass ($m_1 + m_2$)

Figure 14 — Slam shut/open test of sliding doors

7.2.3 Durability of sliding doors and horizontal roll fronts

Open and close the door/roll front for the number of cycles specified. The movement shall be within 10 mm from the fully closed position, without forcing the stops, to a position within 10 mm from the fully open position (see [Figure 15](#)). However, if the door/roll front has a damper and/or catch device ([3.4](#)), including a self-opening or self-closing mechanism, this shall be allowed to operate at each cycle.

The door shall be opened/closed at an average speed not exceeding 0,25 m/s.

The maximum rate is 12 cycles per minute. If a pause is needed, it shall be in the closed position.

Dimensions in millimetres

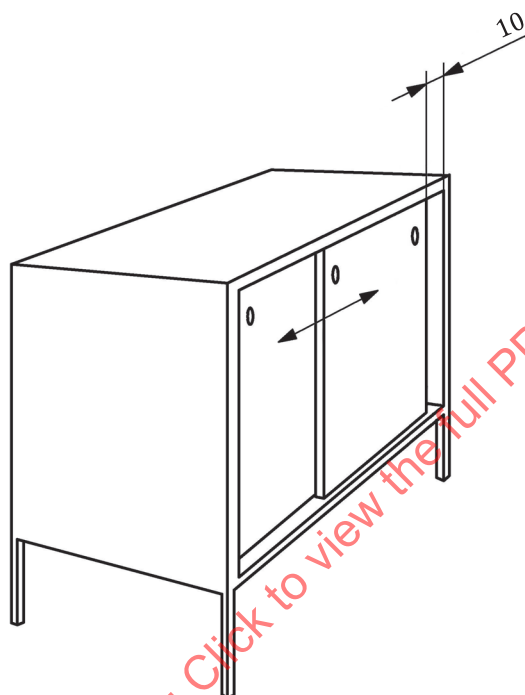


Figure 15 — Durability of sliding doors

7.3 Flaps

7.3.1 General

Load all components intended for storage purposes, including tops, with the specified load(s) in [Table 1](#).

7.3.2 Strength of bottom-hinged flaps

This test only applies to flaps intended to be loaded when used in the open position (e.g. as a work surface).

With the flap in its fully opened/extended position, apply through the loading pad ([5.5](#)) the specified vertical downward force 10 times at the worst-case position but not less than 50 mm from the edges. (see [Figure 16](#)).

Dimensions in millimetres

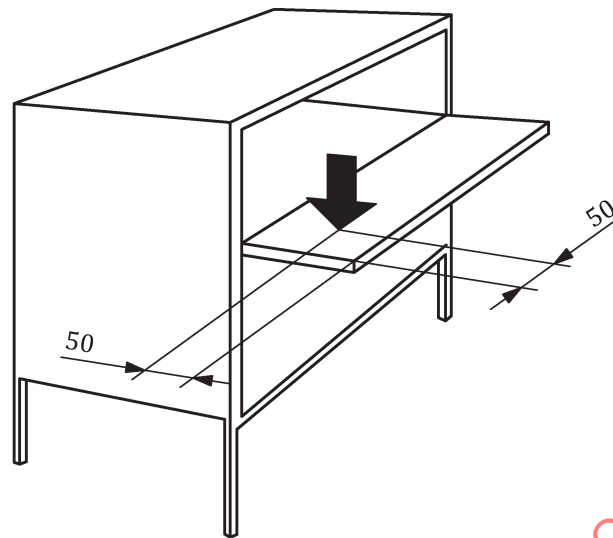


Figure 16 — Strength test of flaps

7.3.3 Durability of flaps

Open/close the flap within 5° of its fully opened/closed position for the number of cycles specified. Use approximately 3 s for opening and 3 s for closing the flap. The maximum rate is 12 cycles per minute, if a pause is needed, it shall be in the closed position. However, if the flap has a damper and/or catch device, including a self-opening or self-closing mechanism, this shall be allowed to operate at each cycle.

Self-locking stay (3.22) shall be opened until just before it locks and then closed from that position.

When the flap is fitted with an adjustable friction stay (3.1), it shall be adjusted so that the flap just opens under its own weight, and be readjusted not more than 10 times during the test.

7.3.4 Drop test for horizontally top-hinged doors/flaps

Lift the door/flap until it is horizontal and allow it to drop freely for the number of cycles specified (see Figure 17).

The maximum rate is 12 cycles per minute. If a pause is needed, it shall be in the closed position.

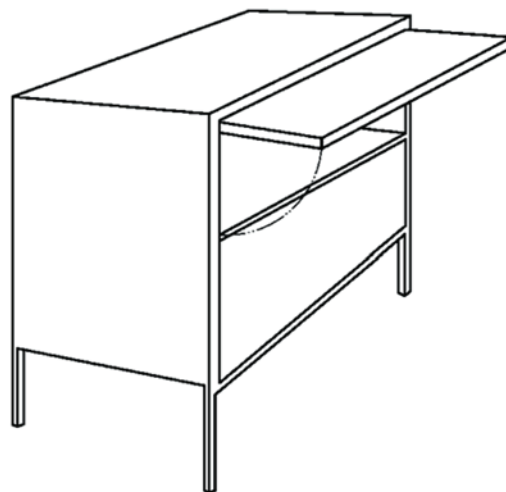


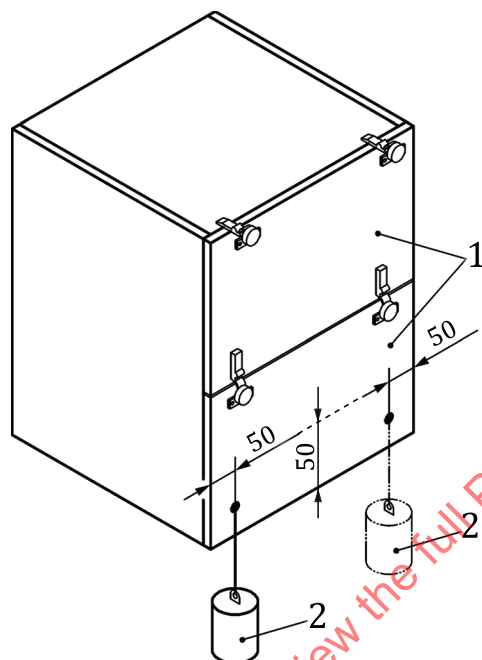
Figure 17 — Drop test for horizontally top-hinged doors/flaps

7.3.5 Vertical downward static load of top hinged flaps

Close the flap and apply the specified vertical static load. The load application points shall be at the surface 50 mm from the left, right and bottom edges (see [Figure 18](#)).

Carry out five times at one side and repeat at the other side.

Dimensions in millimetres



Key

- 1 flap
- 2 test load

Figure 18 — Vertical downward static load of top hinged flaps

7.4 Vertical roll fronts

7.4.1 General

Load all components intended for storage purposes, including tops, with the specified load(s) in [Table 1](#).

7.4.2 Slam shut/open of vertical roll fronts

Allow the roll front to fall freely in both directions from as near the point of equilibrium as possible (see [Figure 19](#)), for 10 cycles.

If the roll front does not fall, the door shall be opened/closed by means of a string or cord attached to the centre of the handle. If the door has no handle, the string shall be attached at the middle of the door.

Determine the mass, m_1 , required to just move the door. The test mass shall be m_1 plus a specified mass: m_2 .

Close/open the door/roll front for the specified number of cycles 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 door/roll front is fully closed/opened.

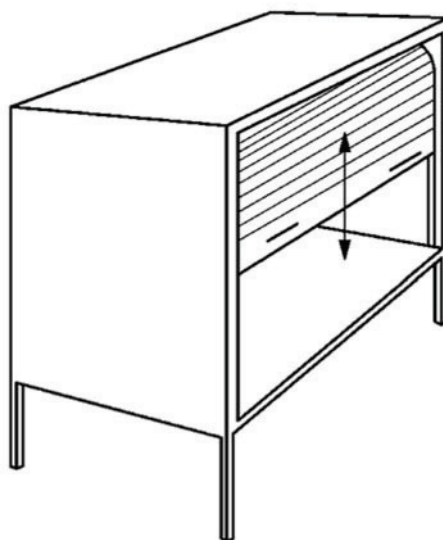


Figure 19 — Slam shut/open of roll front

7.4.3 Durability of vertical roll fronts

By means of a force applied on the vertical centre line, open and close the roll front fully and gently for the number of cycles specified at an average speed not exceeding 0,25 m/s. However, if the roll front has a damper and/or catch device, including a self-opening or self-closing mechanism, this shall be allowed to operate at each cycle.

Excessive acceleration/deceleration and impacts during moving the component shall be prevented. The maximum rate is 12 cycles per minute. If a pause is needed, it shall be in the closed position.

7.5 Extension elements

7.5.1 General

Place stops (5.4) around the legs or base in order to prevent the unit from moving on the floor during the tests.

The test methods in 7.5 are not applicable to extension elements with an internal volume of less than 6,25 dm³.

7.5.2 Strength of extension elements

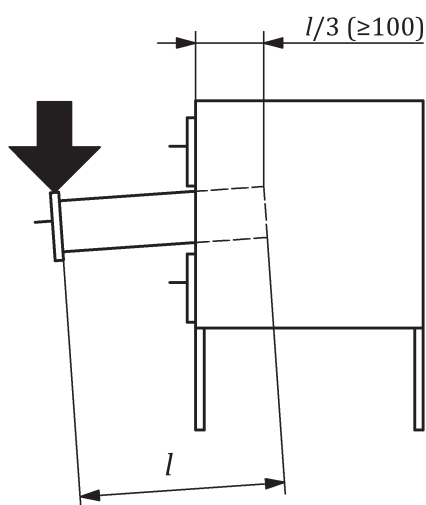
Load all parts intended for storage purposes, including tops, with the specified load(s) in Table 1.

Load the extension element subjected to test with the specified load. When configured for suspended filing pockets, load it with paper or equivalent (5.9) as shown in Figure 21.

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 unit (see Figure 20).

Apply the specified vertical downward static force 10 mm from one side, of the extension element front, at midpoint of its thickness.

Repeat 10 times.

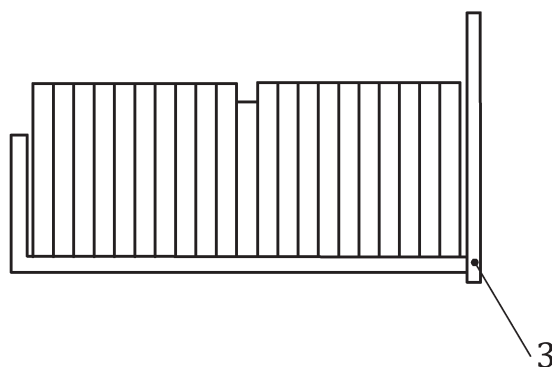
**Key**

l depth of drawer

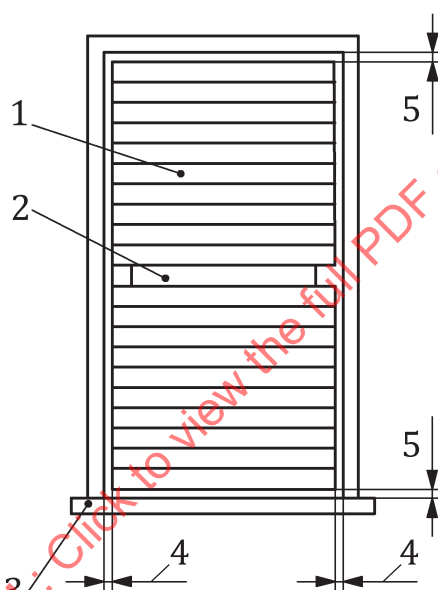
Figure 20 — Strength test of drawers and runners

7.5.3 Durability of extension elements

Load the extension element subjected to test as specified. When configured for suspended filing pockets, load it with paper or equivalent (5.9) as shown in Figure 21.



a) Side view of extension elements



b) Plan view of extension element

Key

- 1 paper
- 2 spacing material
- 3 front of extension element
- 4 air gap
- 5 air gap (25 ± 6 mm)

Figure 21 — Loading of suspended filing pockets with paper

Open and close the extension element gently without impacting the stops and without vertical support for the number of cycles specified.

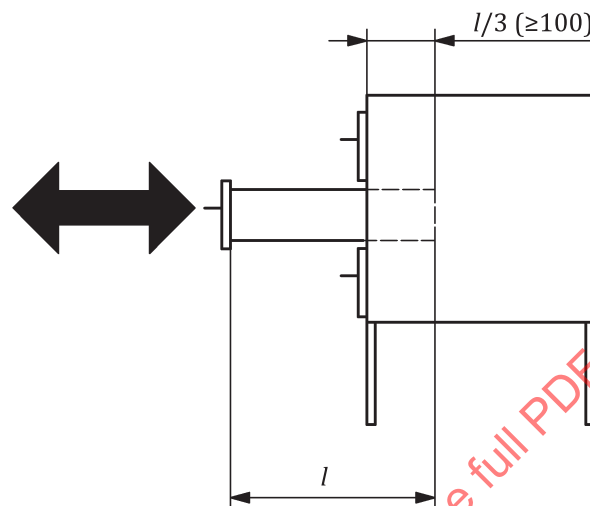
Open from the fully closed position to the point at which one-third of the inside length (depth) of the extension element, or at least 100 mm, remains inside the unit (see [Figure 22](#)). For extension elements or runners ([3.21](#)) that are equipped with any sort of built-in stop in the open position, to within 10 mm from fully opened. If the extension element has a damper and/or catch device, including a self-opening or self-closing mechanism, this shall be allowed to operate at each cycle.

Open and close the extension element at an average speed not exceeding 0,25 m/s via the handle or, in case of two handles, in the middle between the handles. On extension elements without a handle, apply the force at the same level as the runners.

The maximum rate is 12 cycles per minute, if a pause is needed it shall be in the closed position.

When necessary to compensate for ball-bearing cage creep, the extension element may be reset throughout the test by fully opening and closing the element throughout the test.

Dimensions in millimetres



Key

l depth of drawer

Figure 22 — Durability test of drawers and runners

7.5.4 Slam shut of extension elements

Place the extension element subjected to test on its runners and load it as specified with spherical objects (5.8) or, when configured for pocket files, load it with paper or equivalent (5.9) as shown in Figure 21.

Extension elements with stops in the open position shall be opened to 300 mm, or fully opened if they cannot be opened to 300 mm.

Extension elements without stops in the open position shall be opened to a maximum of 300 mm but ensuring that at least 100 mm remains inside the unit.

Slam the extension element shut 10 times using the apparatus specified in Annex D.

The slamming force shall act until 10 mm before the extension element is fully closed. Apply the force to the handle or, in case of two handles, in the middle between the handles. On extension elements without a handle, apply the force at the same level as the runners. After each cycle, the bags shall be rearranged to the original position.

7.5.5 Slam open of extension elements

The slam open test is applicable only to extension elements fitted with stops in the open position.

Place the extension element subjected to test on its runners and load it as specified with spherical objects (5.8) or, when configured for pocket files, load it with paper or equivalent (5.9) as shown in Figure 21.

Open the extension to full stop and close so it is possible to slam open the drawer with a distance of 300 mm, or start fully closed if the distance to full stop is less than 300 mm.

Slam open the extension element 10 times using the apparatus specified in [Annex D](#). The slamming force shall act until 10 mm before the extension element is fully opened.

Apply the force to the handle or, in case of two handles, in the middle between the handles. On extension elements without a handle, apply the force at the same level as the runners. After each cycle the bags shall be rearranged to the original position.

7.5.6 Strength of bottoms in extension elements

Place the extension element subjected to test on its runners, or suspend it in a similar way, and load it with the specified load.

Apply a static force as specified through a loading pad ([5.5](#)), approximately 25 mm above the bottom of the extension element, acting at the middle of the front and back of the extension element (see [Figure 23](#)).

Apply the force 10 times.

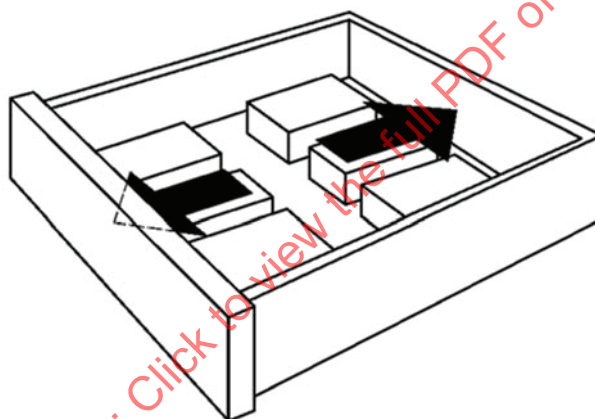


Figure 23 — Strength of drawer bottoms

7.5.7 Interlock test

When interlock ([3.16](#)) is tested, one extension element shall be fully extended, and an outward force as specified shall be applied to the handles of each of the remaining extension elements one at a time.

The test shall be carried out, unloaded and loaded with the specified load in [Table 1](#) until all possible combinations of the extensions have been tested.

Record if the extension elements remain closed.

7.6 Locking and latching mechanism test

7.6.1 General

Prevent the unit from moving during the test without interfering with the operation of the locking/latching mechanism ([3.17](#)) and the furniture component being tested.

Load all parts intended for storage purposes, including tops, with the specified load(s) in [Table 1](#).

Close all doors, flaps and extension elements and lock all locking/latching mechanisms.

7.6.2 Strength test for locking and latching mechanisms for extension elements

Apply a force in the direction of travel of the extension element at a direction 90° to the front of the element and at 30° to that direction, up, down, left and right.

If the test unit is to be used with one specific handle or multiple handles, which are less than or equal to $1/3$ of the width of the front of the extension element, the forces shall be applied at the centre of the handle(s). If no handle is fitted, apply the force to the centre of the front of the extension element. In addition, apply the forces 50 mm from each of the left and right edges of the extension element.

If the handle is more than $1/3$ of the width of the front of the extension element, apply the force to the centre of the handle and 50 mm from each end of the handle.

Repeat the test for each extension element unloaded and loaded with the specified load in [Table 1](#).

7.6.3 Locking and latching mechanisms for doors, flaps and roll fronts

Apply a force in the direction of travel of the door/flap/roll front and at 30° to that direction, up and down.

The force shall be applied to the centre of the handle. If no handle is fitted and the position of the handle is not included in the manufacturer's instructions, the force shall be applied at the most adverse position. If the locking/latching mechanism requires rotation of the handle to operate it, the specified torque shall be applied to the handle in the direction of opening.

Repeat the test for each door, flap and roll front.

7.6.4 Locking and latching mechanism durability test

Open and close the locking/latching mechanism for the specified number of cycles using any suitable test equipment at a rate of not more than 20 cycles per minute.

8 Trays

8.1 General

Trays supported on runners shall be tested in accordance with strength and durability tests for extensions plus sustained load test and drop test.

All other trays shall be tested in accordance with sustained load and drop test.

8.2 Sustained load test for trays

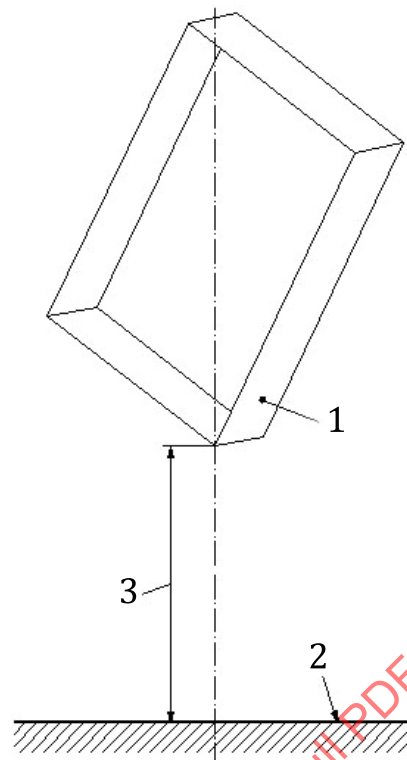
Load the tray ([3.24](#)) with the specified mass. Place the tray in the storage unit and maintain the load for seven days.

8.3 Drop test for trays

Hold the unloaded tray from one corner and drop the tray downwards onto the drop test floor ([5.2](#)), from the specified height for 5 cycles (see [Figure 24](#)).

The specified height shall be measured from the drop test floor to the lowest corner of the tray.

Repeat the test by dropping from the diagonally opposite corner for 5 cycles.

**Key**

- 1 tray
- 2 drop test floor
- 3 drop height

Figure 24 — Tray drop test**9 Strength of coat hooks**

Apply the specified vertical downward force to that part of the hook that extends furthest outwards in the horizontal plane, or to any position likely to cause failure.

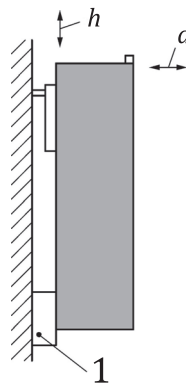
If the hooks are structurally interconnected, apply the force to each hook simultaneously.

10 Units mounted to the building or other structure**10.1 Units not supported by the floor****10.1.1 General**

The tests specified are intended to assess the strength of the devices used for the mounting to the building or structure, including the attachment to the unit.

The unit(s) shall be mounted according to the manufacturer's installation instructions. Where the manner of mounting is ambiguously defined, the manner of mounting shall be recorded.

An adjustable wall attachment device (3.28) shall be adjusted to the maximum depth (as far from the wall as possible) and to the mid of the height adjustment range. Distance devices (3.10) used for levelling the unit shall be placed as low and as far apart as possible (see Figure 25).

**Key**

- 1 distance device
 h height adjustment
 d depth adjustment

Figure 25 — Distance device**10.1.2 Movable parts, shelf supports, tops and bottoms**

These tests can be carried out on a separate unit.

Load all storage areas with the specified load(s) and carry out the following tests on those components most likely to cause failure to the wall attachment device:

- 6.1.5: strength of shelf supports;
- 6.2.2: static load on tops and bottoms;
- 7.1.2: strength of pivoted doors — vertical load;
- 7.2.2: slam shut/open of sliding doors and horizontal roll fronts;
- 7.3.2: strength of bottom hinged flaps;
- 7.4.1: slam shut/open of vertical roll fronts;
- 7.5.2: strength of extension elements.

10.1.3 Static load

These tests shall be carried out on the same unit as used in 10.1.2.

With the exception of shelves and worktops, load all of the storage elements with the specified load.

For shelves and worktops, load according to the following principle.

If the number of shelves is not determined by the structure of the unit(s) or specified in a requirement document, divide the internal height of the unit(s) in millimetres by two hundred and take the lower integer. This number shall then be the number of shelves to be used during testing.

- Load on bottom: specified load;
- Load on first shelf: specified load $\times 0,6$;
- Load on second shelf: specified load $\times 0,4$;
- Load on third and following shelves: specified load $\times 0,25$;

— Load on top surfaces: specified load $\times 0,2$.

If the volume of the unit, calculated by the inner width, depth and height, is greater than $0,225 \text{ m}^3$, the total load shall be multiplied by the factor, R :

$$R = \frac{1,2}{(0,75 + 2V)}$$

where V is the volume of the unit in m^3 .

When reduction of the load is necessary, it shall be removed from the bottom(s).

The unit shall be loaded for one week.

Check whether the unit remains attached to the structure and carries the test load.

10.1.4 Dislodgement test

Close all doors, flaps and extension elements.

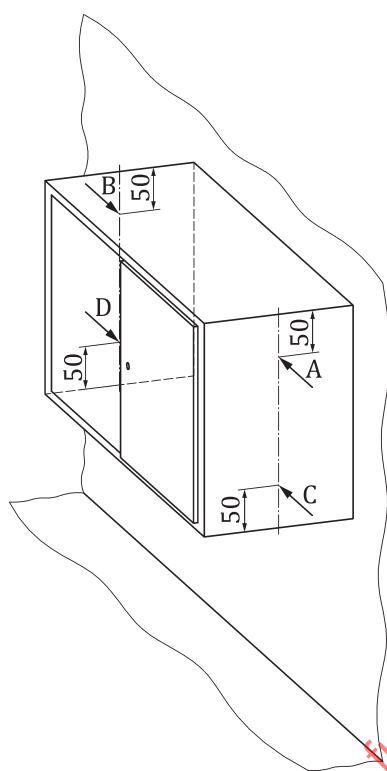
Apply the specified upward force to the unloaded storage unit at the least favourable point of the front edge. The force shall be removed if the vertical distance of travel of the force is more than 10 mm.

NOTE This test is to assess the attachment of the complete storage unit and not the attachment of individual elements within the unit.

10.1.5 Sideward detachment test

Close all extension elements, flaps, roll fronts and doors. The unit shall be unloaded.

Apply, by means of the loading pad (5.5), the specified force one time at points A and B on the centre line of the side of the unit 50 mm from the top and at points C and D 50 mm above the bottom (see Figure 26). If no structural member (3.23) exists at this position, apply the force by means of a rigid bar.

**Key**

A, B, C, D force application points

Figure 26 — Sideward detachment test

10.2 Units supported by the floor

This test applies to units standing or resting on the floor and mounted to the building (e.g. a wall).

The unit shall be mounted according to the manufacturer's instructions.

If the manner of mounting is ambiguously defined, the manner of mounting shall be recorded in the test report.

Apply the specified horizontal outward static force to the centre of the top edge of the unit.

11 Stability tests

11.1 General

The stability tests shall be carried out with the unit placed on the test floor (5.2).

Units intended to be attached to the building structure shall only be tested according to 11.7.

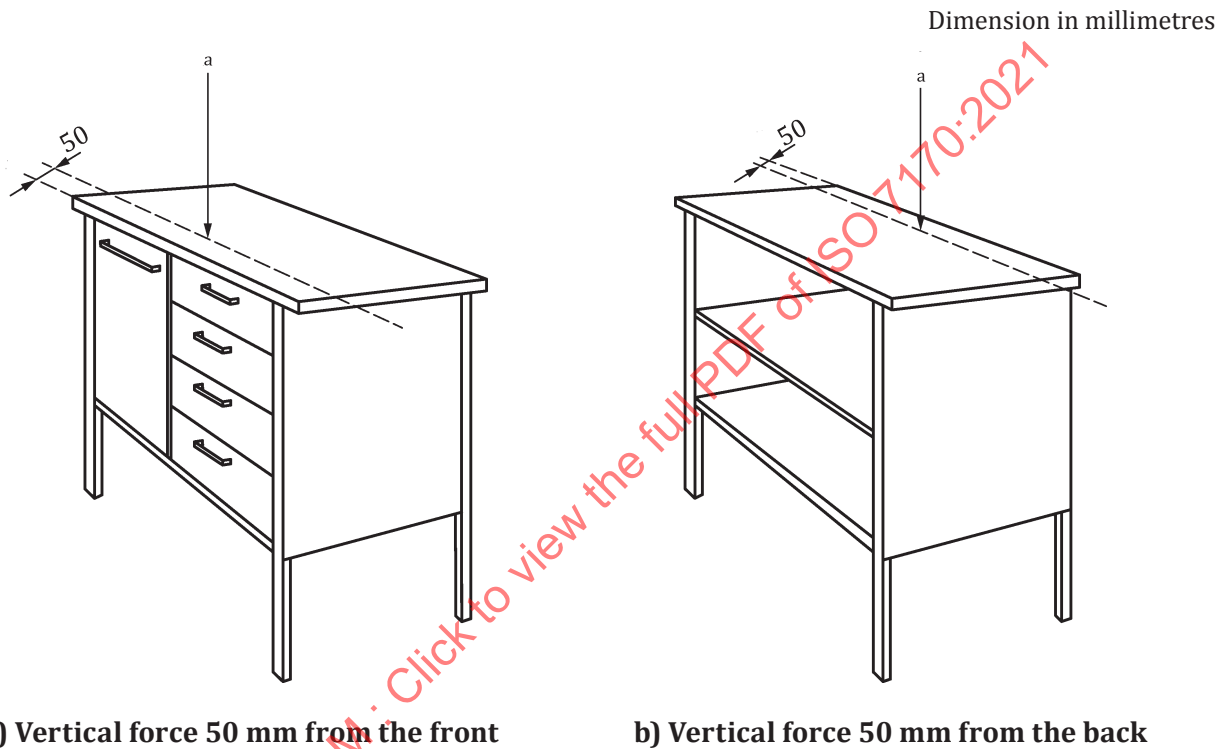
Units where the manufacturers instruction state that the unit is to be placed against a wall or other rigid vertical structure shall not be tested in the rearward direction. Castors and height adjustment devices (3.15) shall be in the position most likely to cause the unit to overturn (3.20).

11.2 Doors, extension elements and flaps closed, all storage units unloaded

11.2.1 Units that are, or can be adjusted to, a height of 1 000 mm or less

Apply the specified vertical force by means of the loading pad on the top surface acting 50 mm from the outer edge of the unit at any point likely to cause overturning (see [Figure 27](#)).

Record if the unit overturns or is supported by an open extension element, opened door or opened flap. If during testing the unit is prevented from overturning by an extension element, open door or flap, the component shall be closed and the test repeated.



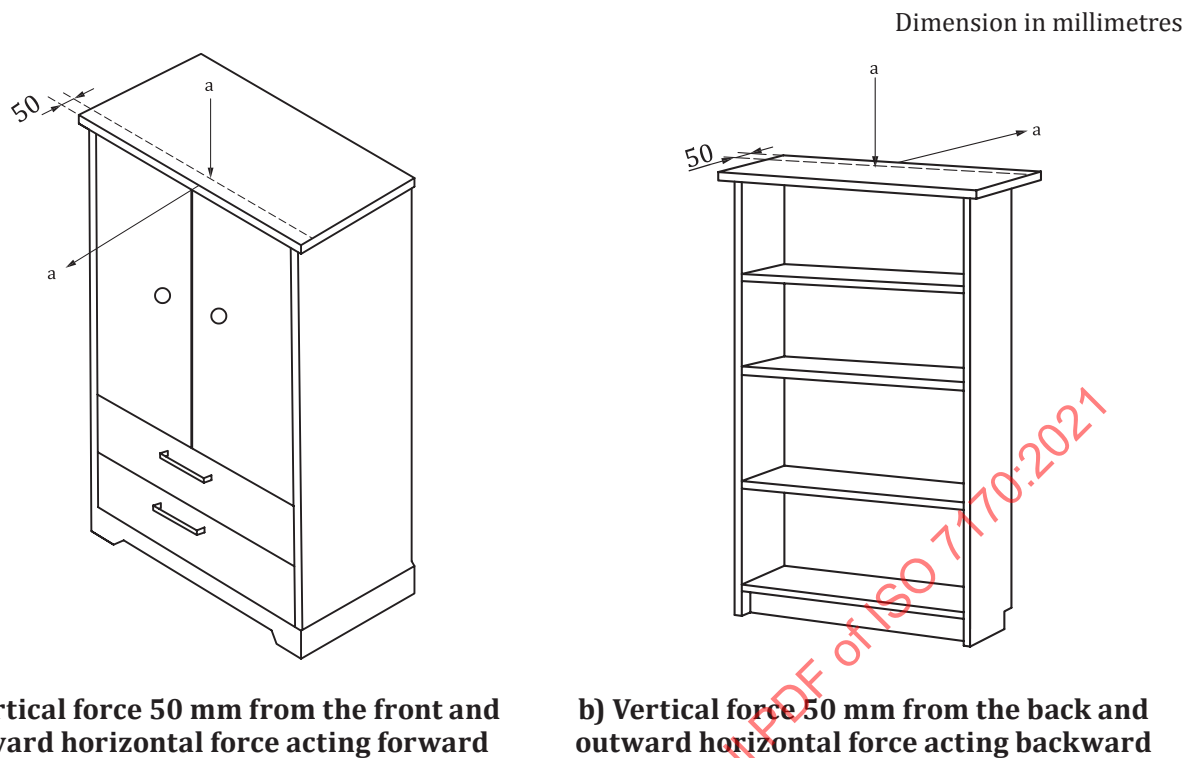
a Force.

Figure 27 — Examples of units that are or can be, adjusted to a height of 1 000 mm or less

11.2.2 Units that are, or can be adjusted to, a height of more than 1 000 mm

Apply a vertical force of 350 N together with the specified outward horizontal force on the top surface acting 50 mm from the outer edge of the unit at any point likely to cause overturning (see [Figure 28](#)).

Record if the unit overturns or is supported by an open extension element, opened door or opened flap. If during testing the unit is prevented from overturning by an extension element, open door or flap, the component shall be closed and the test repeated.



a Force.

Figure 28 — Examples of units that are, or can be adjusted to, a height of more than 1 000 mm

11.3 Opening doors, extension elements and flaps, all storage units unloaded

Apply a horizontal force one at a time to all doors, extension elements or flaps just sufficient to open them 40 mm. Then close the component before testing the next. The opening force shall be applied to the centre of the handle, knob, key, etc.

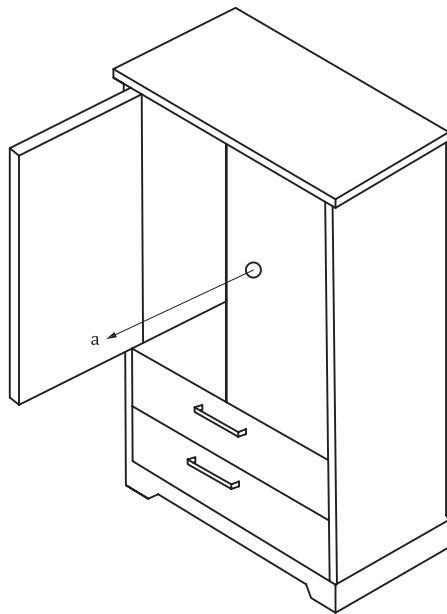
For units with one door, the test shall be carried out with the door opened to its maximum but not more than 90° (see [Figure 29](#)).

When two or more doors are fitted, the test shall be carried out with the worst-case door opened to its maximum but not more than 90°. All other doors shall be closed.

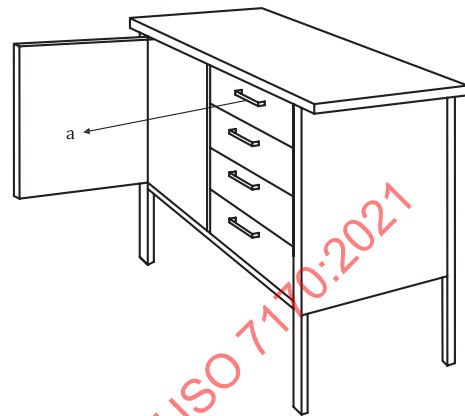
With the worst-case door open, open all extension elements and flaps behind that door, except where there are no stops, in which case they shall be opened to two thirds of the internal length.

The locking mechanism ([3.19](#)) shall be unlocked.

Record if the unit overturns or is supported by an open extension element, opened door or opened flap. If during testing the unit is prevented from overturning by an extension element, open door or flap, the component shall be closed and the test repeated.



**a) Horizontal force
outwards from a closed door**



**b) Horizontal force
outwards from a top drawer**

a Force.

**Figure 29 — Examples of units opening doors, extension element and flaps,
all storage units unloaded**

11.4 Doors, extension elements and flaps opened and unlocked

11.4.1 All storage areas unloaded and all doors, extension elements and flaps open

All doors shall be opened to its maximum but not more than 90° and all extension elements shall be fully opened, except where there are no open stops, in which case they shall be opened to two thirds of the internal length. All flaps shall be fully opened (see [Figure 30](#)).

Interlock mechanisms shall not be overridden.

Record if the unit overturns or is supported by an open extension element, opened door or opened flap.

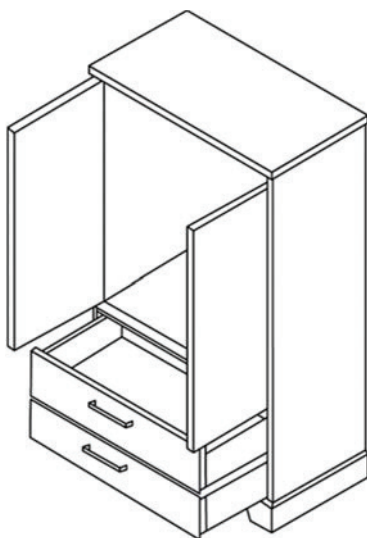


Figure 30 — Example of a unit with all storage areas unloaded and all doors, extension elements and flaps open

11.4.2 All storage areas unloaded with overturning load

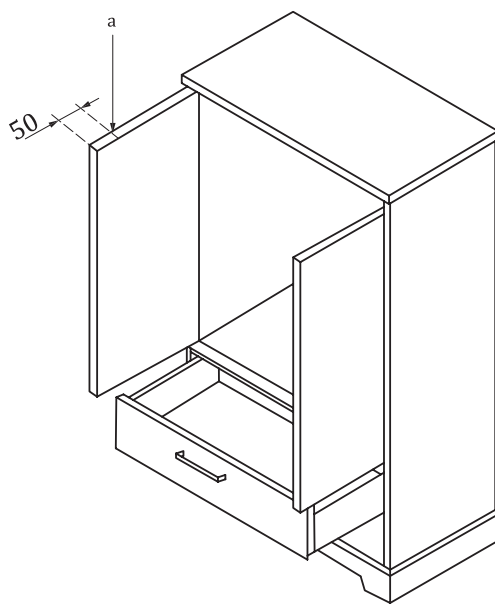
Doors shall be opened to its maximum but not more than 90° and extension elements shall be fully opened, except where there are no open stops, in which case they shall be opened to two thirds of the internal length. Flaps shall be fully opened.

Extension elements and flaps shall be opened across the full width of the unit. Only one extension element in each vertical line of extension elements shall be opened to produce the configuration most likely to cause overturning.

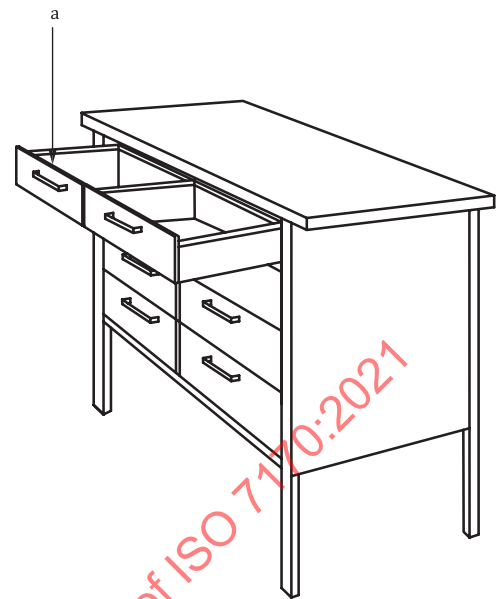
Apply the specified vertical force to any point likely to cause overturning, on the centre line of the front of an extension element or 50 mm from the outer edge of a door or flap (see [Figure 31](#)).

Record if the unit overturns or is supported by an open extension element, opened door or opened flap. If during testing the unit is prevented from overturning by an extension element, open door or flap, the component shall be closed and the test repeated.

Dimension in millimetres



a) Vertical force acting 50 mm from the outer edge of an open door



b) Vertical force acting on the centre line of the front of an extension element

^a Force.

Figure 31 — Example of units, all storage areas unloaded with overturning load

11.4.3 All storage areas loaded with overturning load

All storage areas shall be loaded as with the specified loads according to [Table 2](#).

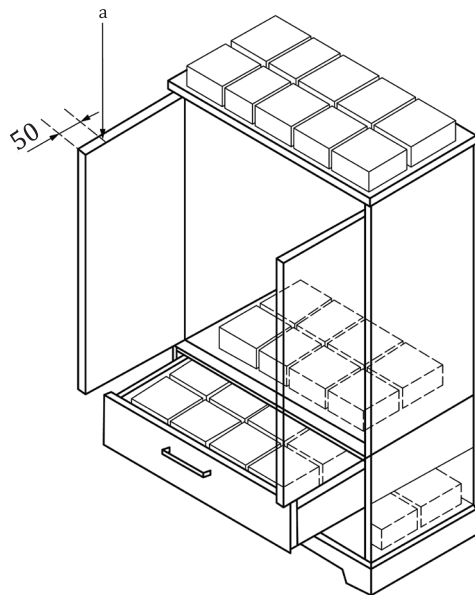
Doors shall be opened to its maximum but not more than 90° and extension elements shall be fully opened, except where there are no open stops, in which case they shall be opened to two thirds of the internal length. Flaps shall be fully opened.

Extension elements and flaps shall be opened across the full width of the unit. Only one extension element in each vertical line of extension elements shall be opened to produce the configuration most likely to cause overturning.

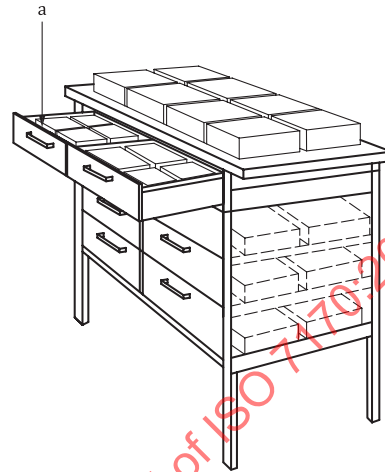
Unless prominently and durably marked by the manufacturer with a maximum load, the total mass of the unit shall be the weight of the unloaded unit plus the load in the unit when loaded with the specified loads according to [Table 2](#).

Apply a vertical force to any point most likely to cause overturning, on the centre line of the front of an extension element or 50 mm from the outer edge of a door or flap (see [Figure 32](#)).

Record if the unit overturns or is supported by an open extension element, opened door or opened flap. If during testing the unit is prevented from overturning by an extension element, open door or flap, the component shall be closed and the test repeated.



a) Vertical force acting 50 mm from the outer edge of an open door



b) Vertical force acting on the centre line of the front of an extension element

a Force.

Figure 32 — Example of units, all storage areas loaded with overturning load

11.4.4 Storage areas partly loaded

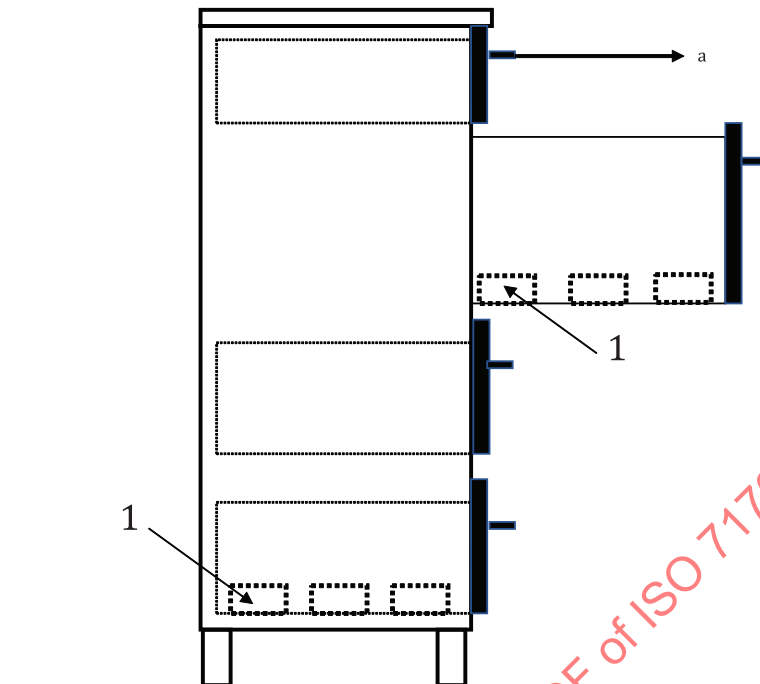
This method only applies to storage units with one or more extension elements and equipped with an interlock system.

Load the extension element with largest capacity according to [Table 2](#).

Determine the component with the second largest capacity and load that component according to [Table 2](#). All other components, including the top surface, shall be unloaded and closed.

Fully open the extension element with largest capacity and apply the specified outward horizontal force on the uppermost extension element. The force shall be applied to the centre of the handhold, handle, knob, etc. in the direction of opening (see [Figure 33](#)).

Record if the unit overturns or is supported by an open extension element, opened door or opened flap. If, during testing, the unit is prevented from overturning by an extension element, open door or flap, the component shall be closed and the test repeated.

**Key**

1 load

a Force.

Figure 33 — Example of unit, storage area partly loaded**11.5 Doors, extension elements and flaps closed and locked, all storage units loaded**

All storage areas shall be loaded with the specified loads according to [Table 2](#).

When two or more doors can be locked, the test shall be carried out on one closed door with the other door opened to its maximum but not more than 90°.

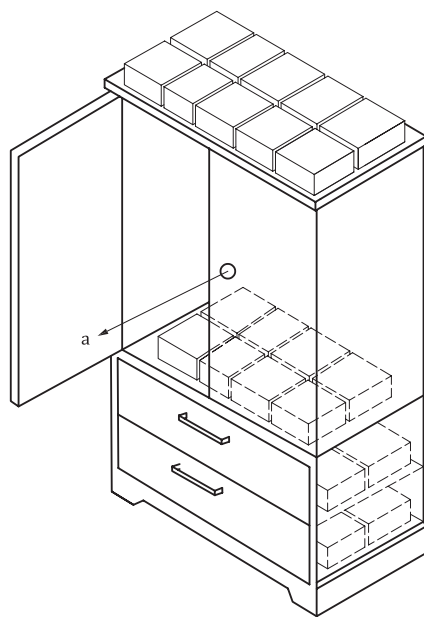
If doors and flaps provide access to other extension elements or flaps, these shall be opened when carrying out the test.

Apply the specified horizontal outward force in turn to all locked doors, extension elements and flaps. The force shall be applied to the centre of the handhold, handle, knob, etc. in the direction of opening.

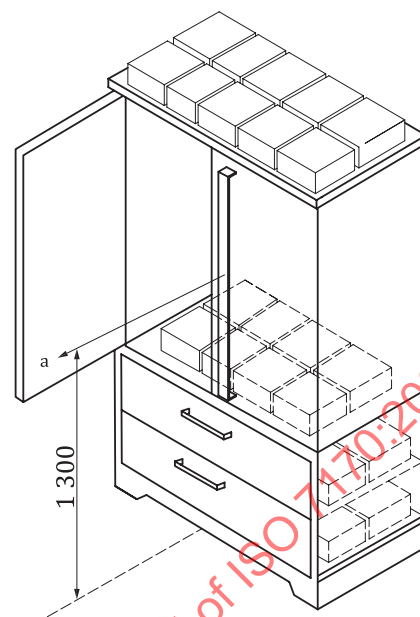
In case of no obvious handhold or if the handhold length covers the whole width or height of the door, apply the force at the most outward or upper position but not more than 1 300 mm above the floor (see [Figure 34](#)).

Record if the unit overturns or is supported by an open extension element, opened door or opened flap. If during testing the unit is prevented from overturning by an extension element, open door or flap, the component shall be closed and the test repeated.

Dimension in millimetres



a) Horizontal force outwards from the locked doors handhold.



b) Horizontal force outwards from the locked doors handhold at 1 300 mm from the floor.

a Force.

Figure 34 — Example of units with doors, extension elements and flaps closed and locked, all storage units loaded

11.6 Dynamic stability test for units with castors

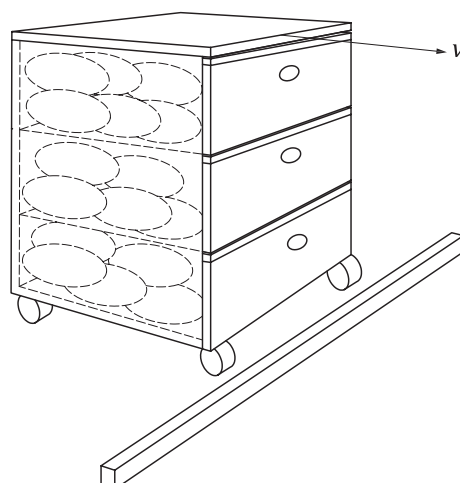
All storage areas shall be loaded with the specified loads according to [Table 2](#), utilizing spherical objects ([5.8](#)) in a suitable bag. All doors, extension elements and flaps shall be closed. Any locking castor shall be unlocked.

Place the storage unit on the test floor ([5.2](#)) with a stop ([5.4](#)). If the unit has a handle for moving the unit then the unit shall be placed such that the handle is parallel to the stop and is the furthest edge from the stop.

If the unit has no handles and has doors or extension elements, the unit shall wherever possible be positioned such that the front of the doors, or extension elements, are perpendicular to the stop.

The storage unit shall travel at a velocity (v) of 0,5 m/s ($\pm 20\%$) towards a stop. The means of moving the unit shall be removed (50 ± 5 mm) before the stop and the unit shall be allowed to strike a stop (see [Figure 35](#)).

Record if the unit overturns.

**Key**

v velocity

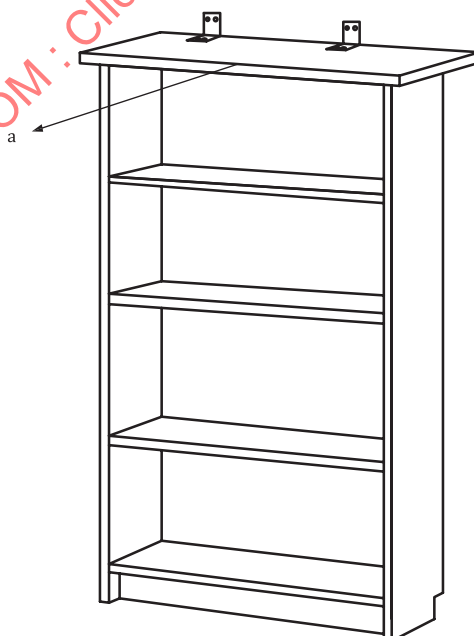
Figure 35 — Example of unit with castors for dynamic stability test

11.7 Strength test for anti-overturning device

This test is applicable to safety devices intended to prevent the overturning of an unloaded storage furniture.

Apply the specified horizontal outward force in the direction most likely to cause the unit to overturn (see [Figure 36](#)).

The force shall be maintained for not less than 10 s and not more than 15 s. Record if the unit overturns.



^a Force.

Figure 36 — Example of strength test for anti-overturning device

11.8 Additional stability test methods for TV furniture

11.8.1 Determination of TV template

The TV template to be used in the stability tests for TV furniture, see [11.8.2](#) and [11.8.3](#), shall be determined by the maximum TV size specified in the manufacturer's instructions, see [Table 4](#), column "Parameter".

In the absence of this information, the determination of the TV template to be used shall be based on the length of the TV support surface, see [Table 5](#).

Table 5 — Determination of TV template

Size of TV mm	Length of TV support surface mm	TV template
≤ 812,8 (= 32 inch)	≤ 710	Template 1
> 812,8 (= 32 inch)	> 710	Template 2

11.8.2 Stability of TV-furniture with one door and/or extension element opened

The storage areas shall be loaded in accordance with [Table 2](#).

For TV-furniture ([3.26](#)) with doors, one door shall be opened to 90° so as to produce the configuration most likely to cause overturning. All other doors shall be closed.

For TV furniture with extension elements one extension element shall be fully opened, except where there are no open stops, in which case they shall be opened to two thirds of the internal length, so as to produce the configuration most likely to cause overturning. All other extension elements shall be fully closed.

Place the unloaded TV template at the centre of a line 150 mm from the front edge of the TV-furniture unit as shown in [Figure 37](#).

Apply a vertical downward force to the centreline of the front of the open extension element or 50 mm from the outer edge of the open door. For TV units with both extension elements and doors, the vertical downward force shall be applied consecutively to each item.

Apply the specified load to the TV template and repeat the above test procedure.

Record if the unit overturns or is supported by an open extension element, opened door or opened flap. If during testing the unit is prevented from overturning by an extension element, open door or flap, the component shall be closed, and the test repeated.

11.8.3 Stability of TV furniture with doors and extension elements closed — Storage areas unloaded

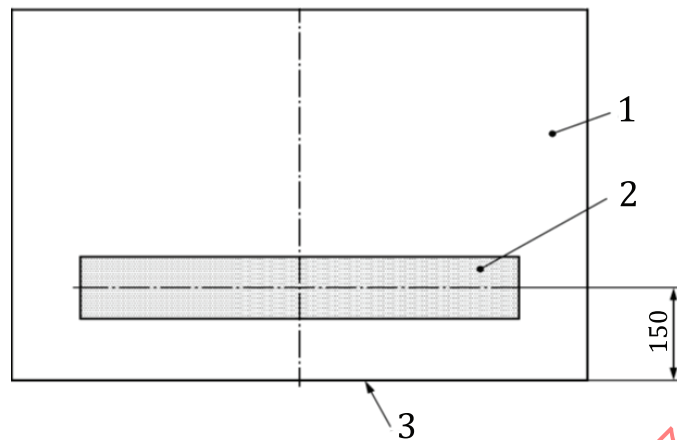
All storage areas shall be unloaded.

All doors and extension elements shall be fully closed.

Place the unloaded TV template at the centre of a line 150 mm from the front edge of the TV furniture unit as shown in [Figure 37](#). Apply a horizontal outward overturning moment to the TV-furniture at the most onerous point in the direction most likely to cause it to overturn.

Apply the specified load to the TV template and repeat the above test procedure.

Dimensions in millimetres

**Key**

- 1 TV furniture (top surface intended for placing TV on)
- 2 TV template
- 3 front edge of TV furniture

Figure 37 — TV — Template positioning — Top view**12 Test report**

The test report shall include at least the following information:

- a) a reference to this document;
- b) name and address of the laboratory;
- c) name and address of the laboratory, and the location where the tests were carried out, if different from the address of the laboratory;
- d) unique identification of the report including an identification of each page and an identification of the end of the test report;
- e) name and address of the client;
- f) description and identification of the item tested (e.g. product type and “name”, photos, etc.);
- g) condition of the test item when received (e.g. ready-to-assemble, mounted, defects, etc.);
- h) date of receipt of the test item;
- i) date(s) and/or period of the performance of test;
- j) identification of the test method(s), load(s) and force(s) used; also temperature and relative humidity when outside the range given in [4.1](#);
- k) the name(s), function(s) and signature(s) of the person(s) authorizing the test report;
- l) a statement that the results relate only to the items tested;
- m) date of issue of the report.

Annex A (informative)

Guidance for the choice of loads, cycles, etc. for storage furniture strength, durability and stability tests

A.1 Principle

This annex provides guidance to develop requirements documents for users who want to specify strength, durability and stability requirements for storage furniture.

[Annex B](#) suggests loads, cycles and forces for strength, durability and stability tests for storage furniture used in domestic and non-domestic application. These ranges of forces, loads, cycles, etc. are suggested in this annex for use when a requirements document is not available, or to assist in the development of one.

The suggested loads, cycles, etc. are intended to ensure that specifiers gain experience in the use of strength and durability test methods, in a manner that makes it possible to compare the test results with those from other specifiers.

A.2 Suggested requirements

A.2.1 Overview

The suggested forces, loads, and cycles should be sufficient to cover not only the full range of applications but also the differences that exist in the manner in which furniture is used in different applications. For example, the loads and cycles applied to a filing cabinet drawer for non-domestic use can be different from those that would be appropriate in domestic use.

A.2.2 General

The following requirements should be used based on the storage furniture's intended use. With appropriate technical rationale, a specifier may select alternative test parameters and requirements.

A.2.3 Stability

The requirements for stability only apply to units where the height to the top of the unit is 600 mm or more above the floor level, and the unloaded mass of the unit exceeds 10 kg.

TV furniture shall be tested regardless of the height and weight of the product.

TV furniture units where the TV support surface is ≤ 600 mm above the floor shall meet the requirements without any wall attachment device fitted, regardless of whether the unit is supplied with a wall attachment device or not.

All wall hanging TV furniture shall be considered to have a TV support surface > 600 mm above the floor.

TV furniture units where the TV support surface is > 600 mm above the floor, supplied with a bracket, shall meet the requirements with the bracket fitted.

TV furniture units where the TV support surface is > 600 mm above the floor, supplied with a wall attachment device other than a bracket, shall meet the requirements without any wall attachment device fitted, regardless of whether the unit is supplied with a wall attachment device or not.

When the unit or component is conspicuously and durably marked by the manufacturer with a maximum load, the unit or component shall be loaded with the stated maximum load multiplied by 0,5, but shall not exceed the load calculated using [Table 2](#).

The unit shall not overturn when tested according to this document using the requirements in [Annexe B](#) depending on the field of applicability.

If the storage unit is prevented from overturning by an open extension element, open door or open flap, the stability requirements are not fulfilled unless the intention is to prevent overturning.

A.2.4 Strength and durability

The requirements for strength and durability apply to all components on the unit unless otherwise specified in the test methods.

It is not necessary that all tests be carried out on the same unit, but all tests specified for a particular component shall be carried out on the same component.

For a range of units featuring similar construction and sharing hardware, or for single units with features utilizing identical hardware and fixings (e.g. a unit with different size drawers), the applicable tests shall be carried out on the worst-case units/components/configurations.

The list below shows examples of worst-case configurations:

- the shelf with the longest span (this may be the bottom of the unit);
- the clothes rail with the longest span;
- the door that produces the greatest load on its hinge(s) (if different types of hinge are used, the door producing the greatest load on each type of hinge shall be submitted for test);
- the largest door/flap;
- the largest extension element (if different types of runner are used, the largest extension element with each type of runner shall be submitted for test);
- one type of each tray used (if different types of trays are used, each type of tray shall be submitted for test);
- one type of each coat hook ([3.6](#)) used.

Worst-case ([3.29](#)) component sizes and optional components shall be tested to the applicable test methods.

The strength and durability requirements are fulfilled when, after testing in accordance with [Annexe B](#) depending on the field of applicability:

- there are no fractures of any member, joint or component;
- there is no loosening of joints intended to be rigid;
- there shall be no damages that impair the function(s);
- there shall be no deflection of shelves that exceeds 0,55 % (or $L/180$) of the span (L) of the shelf, when tested in accordance with [6.1.4](#);
- there shall be no deflection of tops and bottoms that exceed the shelves exceeding 0,55 % (or $L/180$) of the span (L) of the shelf, when tested in accordance with [6.2.1](#), with the exception of tests for domestic use (i.e. [Annex B](#));
- the unit shall remain attached to the building (wall/ceiling) and shall carry the test load when tested in accordance with [10.1.2](#), [10.1.3](#) and [10.1.5](#).

The unit shall not become detached and fall down when tested in accordance with [10.1.4](#) and [10.1.5](#).

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