
**Furniture — Storage units —
Determination of strength and durability**

*Ameublement — Éléments de rangement — Détermination de la
résistance et de la durabilité*

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 7170 was prepared by Technical Committee ISO/TC 136, *Furniture*.

This second edition cancels and replaces the first edition (ISO 7170:1993), which has been technically revised.

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Furniture — Storage units — Determination of strength and durability

1 Scope

This International Standard specifies test methods for determining the strength and durability of storage units that are fully assembled and ready for use, including their movable and non-movable parts.

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

With the exception of the sustained load tests in Clause 6, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes.

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

Tests carried out according to this International Standard are intended to demonstrate the ability of the item to give satisfactory service in its intended environment. The tests have been developed for units/components that have not been in use. However, when properly justified, they may be used for fault investigation.

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 degradation is not included.

This International Standard specifies test methods only. It does not specify requirements. These should be specified in a requirements document. If this is not available, suggested loads and cycles can be found in Annex A.

Annex B describes two apparatuses used for slam-shut and slam-open tests of extension elements.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7619-2:2004, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 2: IRHD pocket meter method*

3 Terms and definitions

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

3.1

catch device

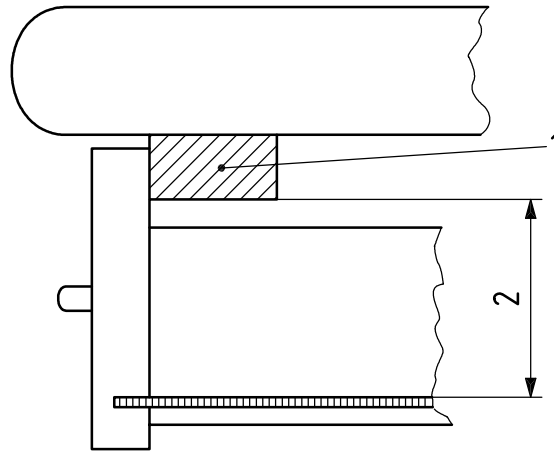
device, which keeps or pulls a component in place

NOTE It does not require a second action in order to release it, e.g. a magnetic catch or a self-closing-mechanism.

3.2

clear height

unobstructed height above the top of the bottom surface, e.g. the top of the extension element bottom and the lower edge of the extension element above, or the structure of the unit (see Figure 1)



Key

- 1 structure of the unit
- 2 clear height

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Figure 1 — Clear height
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3.3

damper mechanism

mechanism which closes the element gently

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3.4

extension element

components that can be pulled out and pushed in

EXAMPLE Drawer, suspended pocket file, keyboard tray.

3.5

flap

horizontally-hinged door, which opens upwards or downwards

3.6

free standing unit

unit not intended to be attached to a load-bearing structure

3.7

interlock

device which restrains the opening of more than one extension element at a time

3.8

latching mechanism

mechanism which retains an extension element or a door in the closed position

NOTE It requires a second action in order to release it.

3.9**locking mechanism**

mechanism that limits access to the interior of a unit or a storage element

NOTE It requires a key or a combination in order to activate it or to make it possible to activate it.

3.10**stay**

hardware component usually used to hold a flap or door in the open position

3.11**top hanging unit**

unit intended to be entirely supported by the ceiling

3.12**wall-, panel- and screen-hanging unit**

unit intended to be supported by a wall, panel or screen

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 with it. The most adverse configuration shall be used for each test. For testing a range of related models, only worst case(s) need to be tested. 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 must be changed to produce the worst-case conditions, this shall be recorded in the test report.

Combination of tests may be necessary to cover the properties of multifunction components; e.g. a receding door shall be tested as a sliding door and as a pivoted door.

For furniture that includes hygroscopic materials, at least one week in normal indoor conditions shall have elapsed between manufacturing (or assembly) and testing.

Except for the test for deflection of shelves (see below), the tests shall be carried out in indoor ambient conditions at a temperature between 15 °C and 25 °C. If during a test, the temperature is outside the 15 °C to 25 °C range, the maximum and/or minimum temperature shall be recorded in the test report.

The test for deflection of shelves, except metal, stone and glass shelves, shall be carried out at a relative humidity (RH) 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.

NOTE The 45 % to 55 % RH range and the corresponding wood moisture content is representative of average indoor conditions in Europe, USA and Canada. Other relative humidities may be appropriate in other parts of the world.

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

During testing, the unit shall be placed on the floor and levelled, unless otherwise specified.

4.2 Test equipment

Unless otherwise specified, the tests may 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.

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.

4.3 Application of forces

The test forces in the static load tests 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 30 s.

In durability tests, the test forces shall be applied at a rate to ensure that excessive heating does not occur. Unless otherwise specified, each test force shall be maintained for $2\text{ s} \pm 1\text{ s}$. If a pause is necessary, it shall be in the closed position.

Forces shall be applied in a manner which ensures normal functioning of self-closing and damping mechanisms.

The forces may be replaced by masses. The relationship $10\text{ N} = 1\text{ kg}$ shall be used.

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4.4 Tolerances

Unless otherwise stated, the following tolerances are applicable:

- forces: $\pm 5\%$ of the nominal force;
- velocities: $\pm 5\%$ of the nominal velocity;
- masses: $\pm 1\%$ of the nominal mass;
- dimensions: $\pm 1\text{ mm}$ of the nominal dimension;
- angles: $\pm 2^\circ$ of the nominal angle.

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

4.5 Sequence of testing

It is recommended that the tests be carried out in the same sequence as the clauses are numbered in this International Standard, see however 8.1.1.

If the clause sequence is not followed, the sequence shall be noted in the test report.

All tests specified for a particular component shall be carried out on the same sample.

4.6 Prevention of movement during test

If a freestanding unit tends to overbalance during the tests specified in Clauses 6 and 7, load the unit until this tendency stops, unless otherwise specified.

If a freestanding 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 (5.3).

4.7 Load on parts not subject to testing

Unless otherwise specified, all storage components, other than the parts being tested, shall be uniformly loaded according to Table 1.

Table 1 — Load on applied to parts other than the part being tested

Part	Load ^a
Horizontal surfaces, shelves, door baskets, etc.	0,65 kg/dm ²
Extension elements	0,2 kg/dm ³
Suspended pocket files	1,5 kg/dm ^a
Clothes rails	2 kg/dm

^a Measured perpendicular to the plane of the filing pockets.

4.8 Inspection and assessment of results

After completion of each test, carry out the inspection again as specified in 4.1, after using adjustment options, if instructions are available.

Record any changes that have taken place since the initial inspection (4.1). Inspection may include measurements, e.g. opening or closing forces or deflections. The inspection shall include at least:

- the fracture of any component or joint;
- the loosening of any joint intended to be rigid, which can be demonstrated by hand pressure;
- the deformation or wear of any part or component such that its functioning is impaired;
- the loosening of any means of fixing components to the unit;
- any impaired function of unit, component or part.

5 Test apparatus

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

For the strength test of the structure and underframe (6.4.1), the surface shall be smooth high-pressure plastics laminate.

For the drop test (6.4.2), the floor shall be faced with a 3 mm thick layer of rubber with a hardness of (85 ± 10) IRHD, according to ISO 7619-2:2004.

5.2 Wall surface, a vertical, rigid and flat surface.

5.3 Stops, devices to prevent the article from sliding but not tilting. They should not be 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 will prevent the item from moving shall be used.

5.4 Loading pad, rigid disc 100 mm in diameter (or 50 mm if it is to be used in a limited space), with a flat face and a 12 mm front edge bend radius.

5.5 Apparatus for slam shut/open of extension elements, two apparatuses as well as calibration instructions are given in Annex B.

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

5.7 Glass marbles, shall be of solid glass with 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.

5.8 Loads for filing pockets, suspended filing pockets shall be loaded with typing paper or an equivalent alternative as shown in Figure 18.

5.9 Steel impact plates, steel 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 7619-2:2004.

A range of steel plates is given in Table A.4.

6 Test procedures for non-movable parts

6.1 Shelves

6.1.1 General

When shelves are structurally interconnected (other than at their ends), all the shelves shall be equally loaded.

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 lower integer. This number shall then be the number of shelves to be fitted.

6.1.2 Shelf retention test

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

6.1.3 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 environment (see 4.1).

Place the shelf on its supports in the unit.

The deflection of the shelf shall be measured at the front edge where it is the 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 2) with the load specified and apply for:

- one hour for shelves made of metal, glass and stone;
- 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.

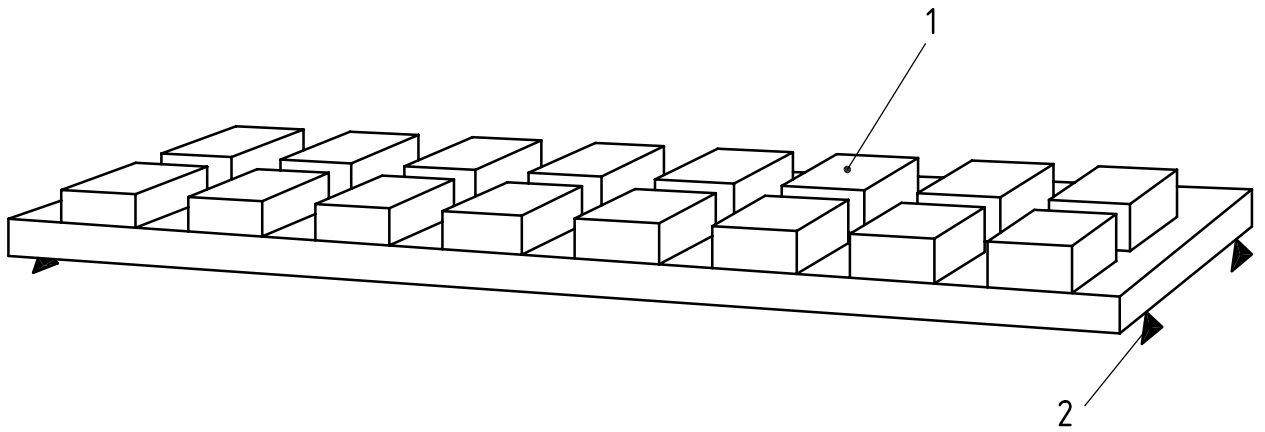
Carry out the inspection and assessment according to 4.8.

6.1.4 Strength of shelf supports

Load the shelf uniformly with half the load specified for 6.1.3, except at 220 mm from one support, where the impact plate (5.9) shall be tipped over 10 times over the support (see Figure 3). The striking surface of the impact plate (5.9) shall be that faced with rubber.

All supports of the shelf shall be tested.

Carry out the inspection and assessment according to 4.8.

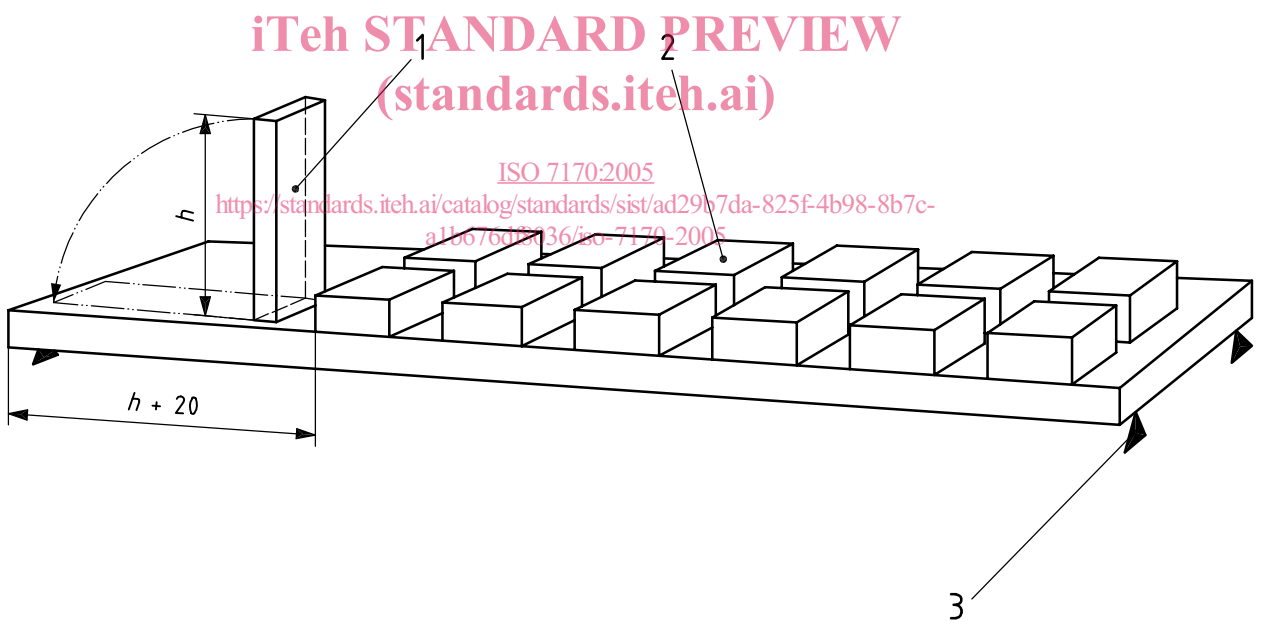


Key

- 1 load
- 2 shelf support

Figure 2 — Deflection test of shelves

Dimensions in millimetres



Key

- 1 steel impact plate
- 2 load
- 3 shelf support

Figure 3 — Strength test of shelf supports