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

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

ICS: 97.140





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# Contents

Page

# Foreword

This document is a proposal for the revision of ISO 7170. It is based upon the European Standard EN 16122.

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.

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 7170:2005), which has been technically revised.

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

## 1 Scope

This International Standard specifies test methods for the 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 bespecified 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 7619-2:2010, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 2: IRHD pocket meter method*

## 3 Terms and definitions

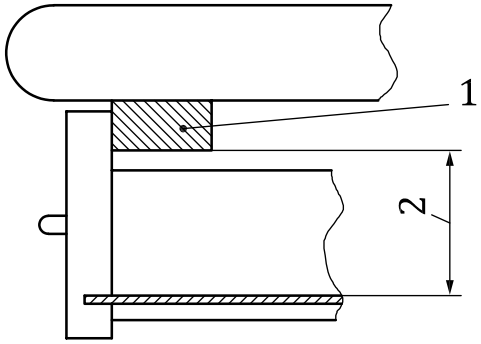
For the purposes of this document, the following terms and definitions apply.

**3.1**
**catch device**
device which keeps or pulls a component in place but does not require a second action in order to release it

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

**3.2**
**clear height**
unobstructed height above the top of the bottom surface, or the structure of the unit

Note 1 to entry: For example, the top of the extension element below and the lower edge of the extension element above. See Figure 1.




**Key**
1 structure of the unit
2 clear height *H*



**Figure 1 — Clear height**



**3.3**
**damper mechanism**
mechanism which gently brings the component to a stop

**3.4**
**extension element**
components that can be pulled out and pushed in

EXAMPLE Drawers, suspended pocket files, keyboard trays.

**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 and which requires a second action to release it and may require a key or a combination in order to activate it

**3.9**
**locking mechanism**
mechanism that limits access to the interior of a unit 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

**3.10**
**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

**3.13**
**tray**
storage element that is designed, under normal use, to be removed from the storage unit and used independently

**3.14**
**levelling device**
adjustable device intended to keep the item of furniture perpendicular to the floor

EXAMPLE Adjustable feet or similar.



## 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 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 conditions, this shall be recorded in the test report.

Levelling devices shall be set as near as possible to 5 mm from the fully open position while ensuring the unit is perpendicular to the floor.

A combination of tests may 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.

Except for the 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 of the range of 15 °C to 25 °C, the maximum and/or minimum temperature shall be recorded in the test report.

The test for deflection of shelves (6.1.4), 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.

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

### 4.2 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 15 s.

The test forces in durability tests 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 ± 1) s.

The forces may be replaced by masses. The relationship 10 *N* = 1 kg shall be used.

### 4.3 Tolerances

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

— Forces: ± 5 % of the nominal force;

— Velocities: ± 5 % of the nominal velocity;

— Masses: ± 1 % of the nominal mass;

— Dimensions: ± 1 mm of the nominal dimension;

— Angles: ± 2° of the nominal angle.



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

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 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 subclauses 6.4.2 and 6.4.3, the unit shall be restrained by stops (5.3).

### 4.5 Loading

Unless otherwise specified, all storage components, which are not subject to testing, shall be uniformly loaded with the specified load(s).

## 5 Test equipment and apparatus

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.

## 5.1 Floor surface

A rigid, horizontal and flat surface.

For the strength of 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 7619-2:2010.

## 5.2 Wall surface

Rigid, vertical and flat

## 5.3 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 will prevent the item from moving shall be used.

## 5.4 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 may be used.



## 5.5 Apparatus for slam shut/open of extension elements



Two examples for suitable apparatus as well as calibration instructions are given in Annex B.

## 5.6 Masses

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 length of 85 mm, a width of 50 mm, a thickness of 30 mm and a mass of 1 000 g are suitable.

## 5.7 Glass marbles

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

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 7619-2:2010.

Other properties of steel impact plates are as defined in Table 1.

**Table 1 — 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 |

### 5.10 Obstacles for castor durability tests

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.

## 6 Test procedures for non-movable parts

### 6.1 Shelves

#### 6.1.1 General

Where 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 nearest integer. This number, minus one, shall then be the number of shelves to be fitted.



#### 6.1.2 Shelf retention test – horizontal outward force



This test is only applicable to shelves, which are not fixed.

Apply the horizontal, outwards 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, which are not fixed.

By means of the 50 mm diameter loading pad (5.4), apply the vertical downwards force specified to a point 25 mm in 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 (see 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 ± 0,1 mm with reference to a straight line parallel to the front edge drawn between two adjacent supports.

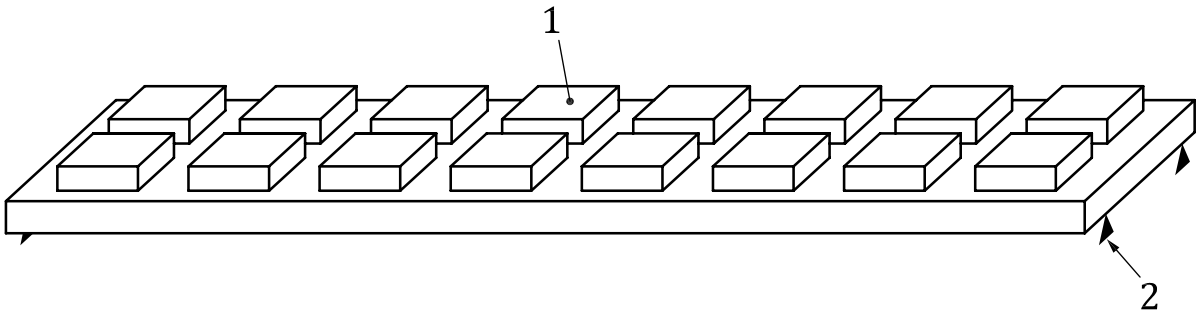
Load the shelf uniformly (see Figure 2) with the load specified and apply for

— one hour for shelves made of metal, glass and stone, 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 ± 0,1 mm and as a percentage of the distance between the supports.




**Key**

1 load

2 shelf support

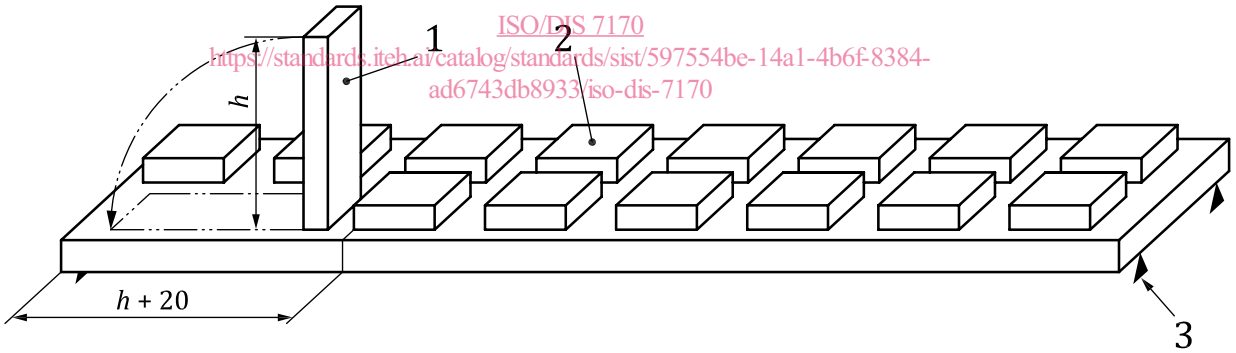
**Figure 2 — Deflection test of shelves**

### 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 (5.9) 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.



Dimensions in millimetres






**Key**

1 steel impact plate

2 load

3 shelf support

h length of impact plate

**Figure 3 — 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.

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

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