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EUROPEAN STANDARD

EN 15939

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English Version

Hardware for furniture - Strength and loading capacity of wall attachment devices

Quincaillerie d'ameublement - Résistance mécanique et capacité de charge des dispositifs de fixation au mur

Möbelbeschläge - Festigkeit und Tragfähigkeit von Schrankaufhängern

This European Standard was approved by CEN on 22 July 2018.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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EN 15939:2019 (E)**European foreword**

This document (EN 15939:2019) has been prepared by Technical Committee CEN/TC 207 “Furniture”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2019, and conflicting national standards shall be withdrawn at the latest by December 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 15939:2011+A1:2014.

Compared to EN 15939:2011+A1:2014 the following modifications were made:

- a) test frame B deleted;
- b) one reference test frame is supposed to be used as basis for the settings A, B and C;
- c) verification of functionality and top surface test added;
- d) Annex C (informative) “Approximate calculation of vertical and horizontal forces” added.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies test methods for the verification of the loading capacity of all types of wall attachment devices for storage furniture and their components.

It does not apply to devices intended to prevent the overturning of storage furniture.

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

With the exception of the corrosion test in 6.3, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes.

The tests can be applied to the part attached to the furniture alone or to the combination of the part attached to the furniture and the part attached to the wall. The attachment into the wall is not included.

The strength tests are carried out in a test frame with specified properties.

The test results are only valid for the devices tested. These results can be used to represent the performance of production model, provided that the tested model is representative of the production model.

With the exception of the corrosion test, ageing and influences of temperature and humidity are not included.

Annex A (normative) includes requirements for product information.

Annex B (informative) includes a method for the determination of loading capacity.

Annex C (informative) includes an approximate calculation of vertical and horizontal forces.

2 Normative references (standards.iteh.ai)

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.

EN 310, *Wood-based panels - Determination of modulus of elasticity in bending and of bending strength*

EN 319, *Particleboards and fibreboards - Determination of tensile strength perpendicular to the plane of the board*

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

EN 323, *Wood-based panels - Determination of density*

EN 10025-2:2004, *Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10230-1, *Steel wire nails - Part 1: Loose nails for general applications*

EN 10305-5, *Steel tubes for precision applications - Technical delivery conditions - Part 5: Welded cold sized square and rectangular tubes*

EN 16122:2012, *Domestic and non-domestic storage furniture - Test methods for the determination of strength, durability and stability*

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

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ISO 48-5, *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:

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

3.1**loading capacity****M**

mass in kg, as specified by the manufacturer, for which one wall attachment device / one set of wall attachment devices will fulfil the strength requirements specified in this standard

Note 1 to entry: A test method for the determination of the loading capacity is described in Annex B (informative).

3.2**wall attachment device**

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

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Note 1 to entry: A component that is attached to the cabinet is e.g. a suspension bracket.

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

Note 3 to entry: A set of wall attachment devices consisting of more than one component (e.g. an upper and lower part).

4 General test condition**4.1 Preliminary preparation**

The wall attachment device(s) shall be mounted according to the instructions supplied with them. The most adverse configuration shall be used and the mounting or assembly method shall be recorded in the test report.

If mounting or assembly instructions are not supplied, the most adverse configuration shall be used and the mounting or assembly method shall be recorded in the test report.

The fixing to the wall shall be of such strength that the test result is not influenced.

Fittings shall be tightened before testing and shall not be re-tightened unless specifically required in the manufacturer's instructions. If the configuration is to be changed to produce the worst-case conditions, this shall be recorded in the test report.

For testing a range of related wall attachment devices, only worst case(s) need to be tested.

The tests shall be carried out in indoor ambient conditions at a temperature between 15 °C and 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.

Wall attachment devices which include structural hardware parts made of hygroscopic plastic materials, e.g. polyamide shall be conditioned at (23 ± 5) °C and a relative humidity of (50 ± 5) % for at

least seven days before testing. Particle boards used for the test setting shall be kept in the standard climate for at least 7 days before testing.

Before beginning the testing, visually inspect the wall hanging device(s) thoroughly. Record any defects so that they are not assumed to have been caused by the tests. Carry out measurements when specified.

4.2 Test equipment

4.2.1 Test wall

A rigid, vertical and flat surface.

4.2.2 Particle board properties

The properties of the particle board shall be as specified in Table 1. The thicknesses shall be as specified in Clause 5 and the thickness tolerance shall be $\pm 0,3$ mm.

Table 1 — Particle board properties

Property	Reference standard	Requirement
Axial withdrawal of screws on particle board's face	EN 320	(1 100 \pm 100) N
Density	EN 323	(0,65 \pm 0,05) g/cm ³

4.2.3 Fibreboard properties

The properties of the fibreboard shall be as specified in Table 2. The thickness shall be 3,2 mm \pm 0,3 mm.

Table 2 — Fibreboard properties

Property	Reference standard	Requirement
Cross tensile strength	EN 319	> 0,5 N/mm ²
Bending strength	EN 310	> 30 N/mm ²

4.2.4 Steel impact plate

A 1,7 kg steel impact plate 200 mm \times 109 mm \times 10 mm faced with a 3 mm thick layer of rubber with a hardness of (85 \pm 10) IRHD according to ISO 48-5.

NOTE For certain applications (e.g. contract and office furniture) a use of a 2,5 kg steel impact plate 200 mm \times 160 mm \times 10 mm faced with a 3 mm thick layer of rubber with a hardness of (85 \pm 10) IRHD according to ISO 48-5 can be necessary.

4.2.5 Dowels

Round dowels with a diameter of (8 \pm 0,1) mm, 30 mm in length, made of beech without any grooves.

4.2.6 Nails

2 mm \times 30 mm steel wire nails according to EN 10230-1.

4.2.7 Levelling devices

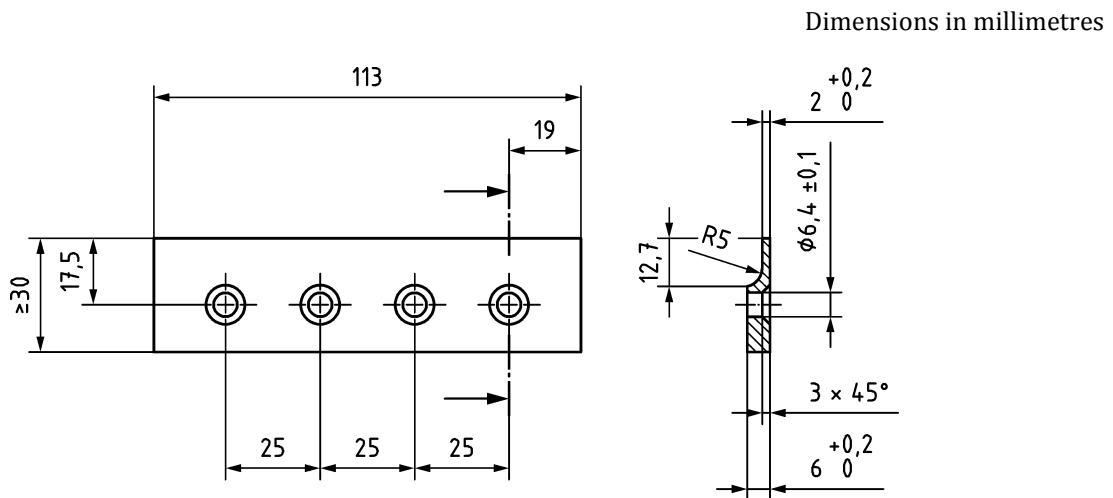
50 mm \times 50 mm with a smooth melamine surface.

NOTE Usually a piece of melamine faced particle board is used.

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4.2.8 Non-commercial wall part

The non-commercial wall part (see Figure 1) shall be used for testing when the wall part is not submitted together with the cabinet part. It shall be milled out of steel EN 10025-2:2004 – S235JR.



Tolerances: $\pm 0,5$ mm of the nominal dimensions, unless otherwise stated

Figure 1 — Non-commercial wall part
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4.3 Application of forces

The forces in the load tests shall be applied sufficiently slowly to ensure that negligible dynamic force is applied.

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

4.4 Tolerances

Unless otherwise stated, the following tolerances are applicable:

- Forces: $\pm 5\%$ of the nominal force;
- Masses: $\pm 1\%$ of the nominal mass;
- Dimensions: ± 1 mm of the nominal dimension;
- Angles: $\pm 2^\circ$ of the nominal angle.

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

4.5 Test sequence

The tests shall be carried out in the same sequence as the clauses are numbered in this European Standard.

5 Test setting

5.1 Test frame

Three test frames may be used (A, B and C) [see 5.3 and Annex C (informative)].

The three test frames simulate three different wall hanging cabinets with different height/depth relation (see Figure 10, Figure 11 and Figure 12):

- Test frame A: height > depth;
- Test frame B: height = depth;
- Test frame C: height < depth.

For testing, that test frame has to be selected, that is closest to the cabinet dimensions for which the wall attachment device is intended.

The test frame is made of steel. For all tests in test frame A, the test cabinet T1 (see Figure 4) is mounted. In test frame B and test frame C, the test cabinet T2 (see Figure 7) is mounted.

The test frame shall be made as follows:

- a) the steel frame shall be made of square, hollow components (30 mm × 30 mm × 1,5 mm) according to EN 10305-5 (see Figure 2);
- b) the pivoting arm, 600 mm in length, shall be a square, hollow component (30 mm × 30 mm × 1,5 mm) according to EN 10305-5 (see Figure 2);
- c) the loading panel shall be made out of particle board (see 4.2.2). The dimensions for B1 shall be 600 mm × 300 mm (Figure 6) and for B2 1000 mm × 600 mm (Figure 9). The thickness of the loading panel shall be sufficient to bear the load, but at least 19 mm. For test frame C the loading panel is mounted on the top of the test frame.
- d) the side panels of test cabinets T1 and T2 shall be manufactured according to Figure 5 b) or Figure 8 b) out of particle board (see 4.2.2) with a thickness of 16 mm. They shall be with a groove for the back panel;
- e) the top panels of test cabinets T1 and T2 shall be manufactured according to Figure 5 a) or Figure 8 a) out of particle board (see 4.2.2) with a thickness of 16 mm;
- f) the back panel of test cabinets T1 and T2 shall be made out of fibreboard (see 4.2.3) with the dimensions 250 mm × 517 mm × 3,2 mm for T1 and 200 mm × 917 mm × 3,2 mm for T2.

The steel frame shall be welded together all around all cross sections.

The top panel of test cabinets T1 and T2 (see Figure 5 a) or Figure 8 a)) shall be jointed to the side panels using wooden dowels (4.2.5) without the use of glue.

The side panels of test cabinets T1 and T2 (see Figure 5 b) or Figure 8 b)) shall be fixed to the steel frame in a manner so that the displacement of the side panels in relation to the steel frame under the applied load is no more than 1 mm. The side panels shall be fixed to the steel frame at least 100 mm from the top of the side panel.

The loading panel shall be fixed to the steel frame (see Figure 10, Figure 11 or Figure 12) in a manner so that the horizontal displacement of the loading panel in relation to the steel frame under the applied load is no more than 1 mm.

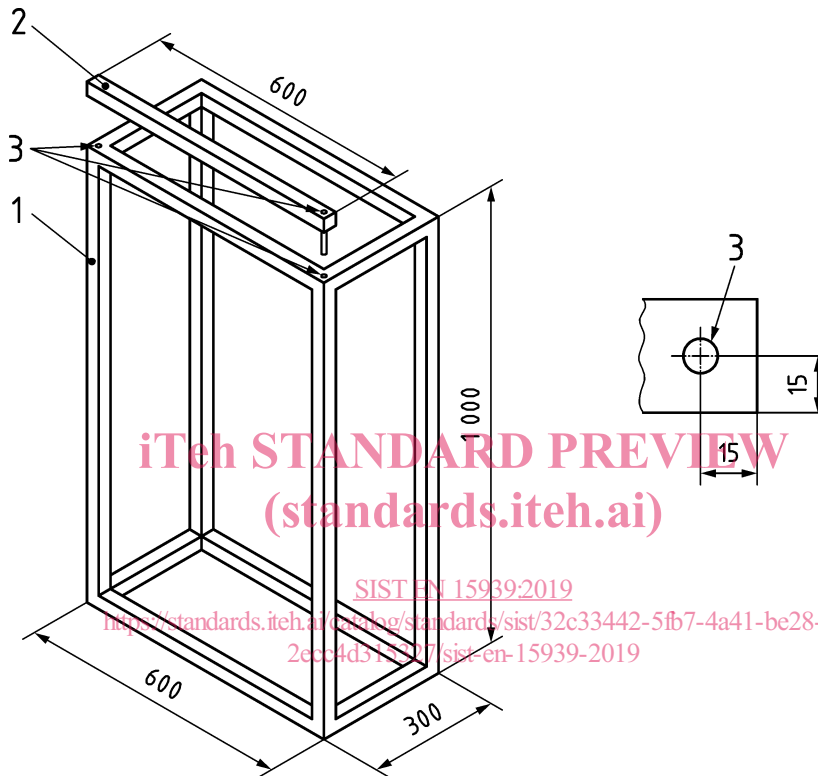
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The back panel shall be nailed with nails (see 4.2.6) every 100 mm (see Figure 3).

In case that an appropriate installation according to the manufacturer's instruction is not possible because of the characteristics of the wooden test cabinets T1 and T2, the dimensions of the wooden parts can be adapted in a suitable manner (e.g. modifying the wooden panel's height or depth). The thickness of the wooden panels shall not be changed. Any direct contact between wall attachment components and steel frame shall be avoided.

All changes shall be clearly stated in the test report.

Dimensions in millimetres



Key

- 1 test frame
- 2 pivoting arm
- 3 pivoting points

Figure 2 — Reference test frame (with dimensions 600 mm × 300 mm × 1 000 mm)