BS EN 15939:2011+A1:2014

BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN 15939:2011+A1:2014. It supersedes BS EN 15939:2011, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by A1 A1.

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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 12 November 2011 and includes Amendment 1 approved by CEN on 14 December 2013.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 15939:2011+A1:2014) 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of an identical text or by endorsement, at the latest by August 2014, and conflicting national standards shall be withdrawn at the latest by August 2014.

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

This document supersedes EN 15939:2011.

This document includes Amendment 1, approved by CEN on 2013-12-14.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟨A1⟩ ⟨A1⟩.

⟨A1⟩ According to the CEN/CENELEC Internal Regulations, the national standards organizations 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom. ⟨A1⟩

1 Scope

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

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 may be used to represent the performance of production models 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.

2 Normative references

[A1] The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. [A1]

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 ISO 6270-2, *Paints and varnishes — Determination of resistance to humidity — Part 2: Procedure for exposing test specimens in condensation-water atmospheres*

ISO 7619-2, *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
loading capacity
M
mass in kg, as specified by the manufacturer, for which one wall attachment device will fulfil the strength requirements specified in this standard

NOTE 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 (e.g. suspension bracket) and the component that is attached to the wall (e.g. hook, rail)

3.3
non-commercial wall part
piece of test equipment specified in 4.2.8

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.

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 which is so constructed that the deformation under the applied load is no more than 1 mm.

4.2.2 Particle board properties

The properties of the particle board shall be as specified in Table 1. The thickness tolerance shall be ± 0,3 mm.

Table 1 — Particle board properties

Property	Referenced standard	Requirement
Axial withdrawal of screws	EN 320	(1 100 ± 100) N
Density	EN 323	(0,65 ± 0,05) g/cm^3

4.2.3 Fibre board properties

The properties of the fibre board shall be as specified in Table 2. The thickness shall be 3,2 mm ± 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 × 109 mm × 10 mm faced with a 3 mm thick layer of rubber with a hardness of (85 ± 10) IRHD according to ISO 7619-2.

4.2.5 Dowels

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

4.2.6 Nails

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

4.2.7 Distance devices

50 mm × 50 mm with a smooth melamine surface.

NOTE Usually a piece of melamine faced particleboard is used.

4.2.8 Non-commercial wall part

The non-commercial wall part (see Figure 1) shall be milled out of steel EN 10025-2:2004 – S235JR.

Dimensions in millimetres
Tolerances: ± 0,5 mm of the nominal dimensions, unless otherwise stated

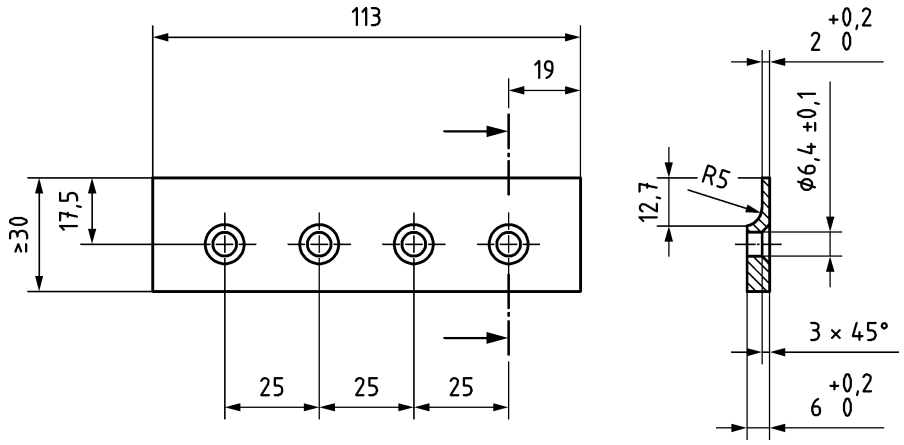


Figure 1 — Non-commercial wall part

4.3 Application of forces

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

The forces may be replaced by masses. The relation 10 *N* = 1 kg shall be used for this purpose.

4.4 Tolerances

Unless otherwise stated, the following tolerances are applicable:

— Forces: ± 5 % of the nominal force;

— Masses: ± 1 % of the nominal mass;

— Dimensions: ± 1 mm of the nominal dimension;

— Angles: ± 2° 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.

5 Test frame

Depending on the type of wall attachment device to be tested, there are two different test frames (A and B), see Figure 2.

The test frames (see Figure 2) 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;

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;

c) [A1] the bottom panel shall be reference particle board, thickness 22 mm ± 0,3 mm (see Table 1); for test frame B, the bottom panel consists of two parts [A1];

d) the side panels for frame A and B shall be manufactured according to Figure 4 out of reference particle board (see Table 1), thickness 16 mm ± 0,3 mm; they shall be with a groove for the back panel;

e) the top panels for frame A and B shall be manufactured according to Figure 3 out of reference particle board (see Table 1), thickness 16 mm ± 0,3 mm;

f) the back panel, 250 mm × 517 mm, shall be out of reference fibreboard (see Table 2), thickness 3,2 mm ± 0,3 mm.

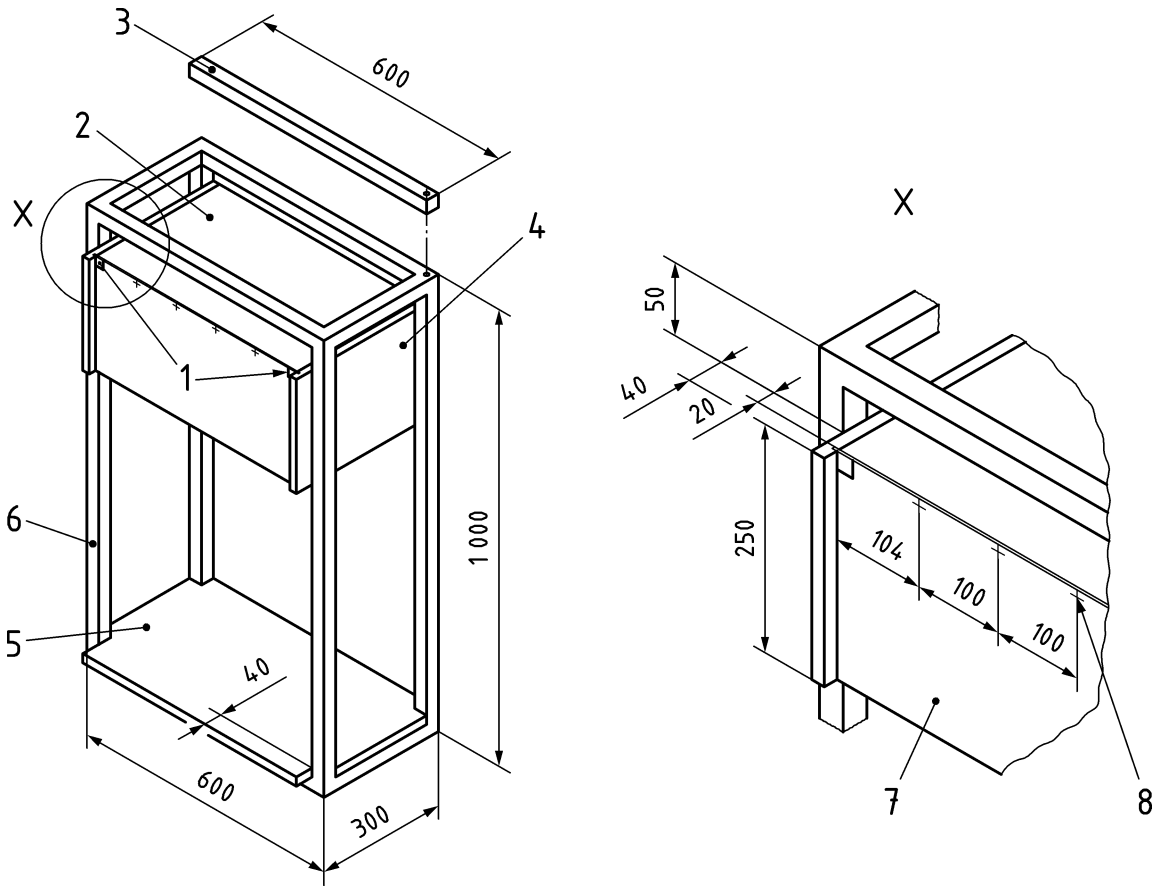
The steel frame shall be welded together all around all cross sections.

The top panel (see Figure 3) shall be jointed to the sides using wooden dowels (4.2.5) without the use of glue.

The side panels (see Figure 4) shall be fixed to the steel frame in a manner so that the deformation of the side panels in relation to the steel frame under the applied load is no more than 1 mm.

The back panel shall be nailed with nails (4.2.6) every 100 mm (see Figure 2).

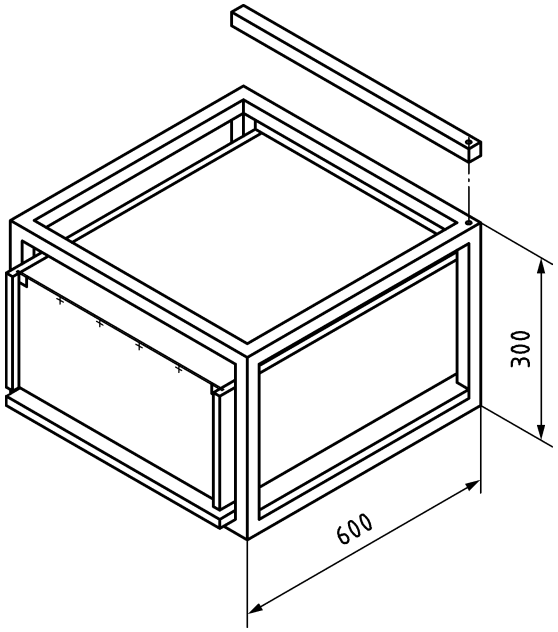
Dimensions in millimetres



a) Test frame A (with dimensions 600 mm × 300 mm × 1 000 mm)

Dimensions in millimetres

Dimensions, keys and witness lines as in Figure 2 a), unless otherwise stated



b) Test frame B (with dimensions 600 mm × 600 mm × 300 mm)

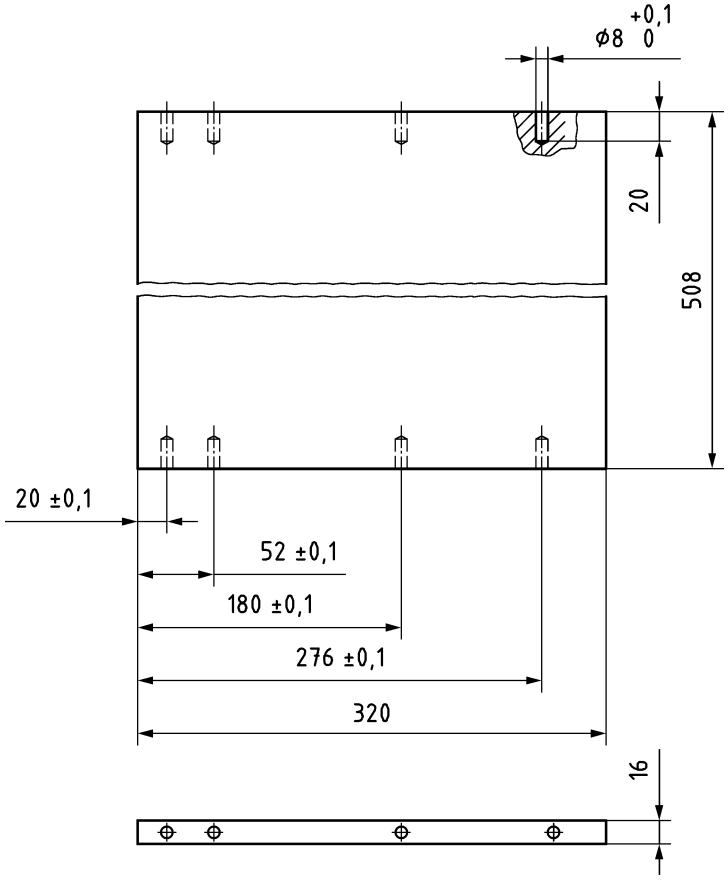
Key

1 wall attachment devices
2 top panel
3 pivoting arm
4 side panel
5 bottom panel
6 test frame according to 5 a)
7 back panel
8 nail positions

NOTE Test frame type A – vertical load is dominating; test frame type B – horizontal load is dominating.

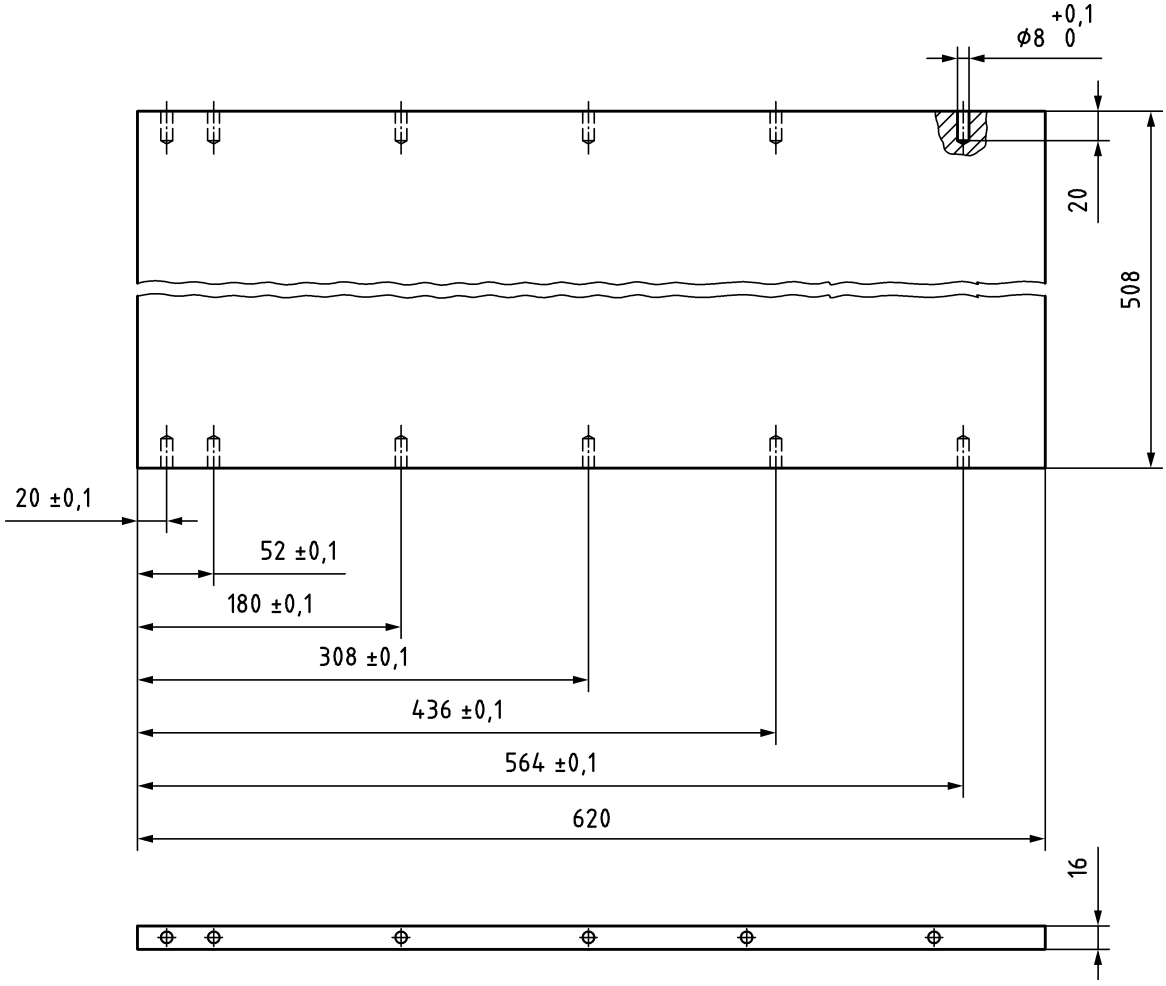
Figure 2 — Test frames A and B, examples with side mounted wall attachment devices

Dimensions in millimetres



a) Top panel A

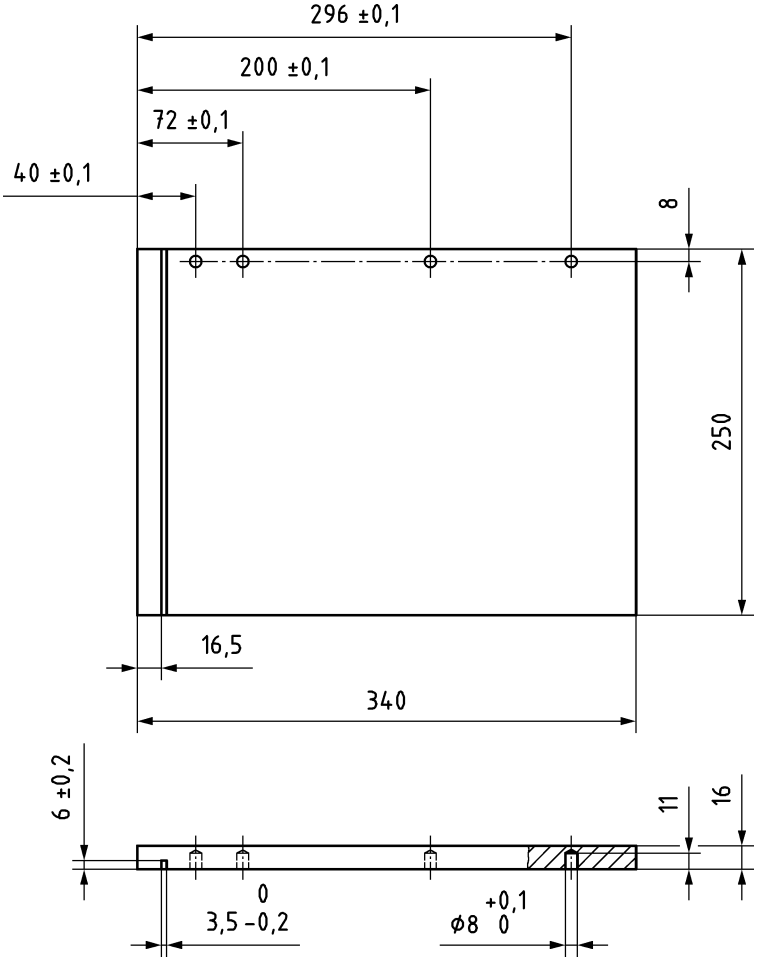
Dimensions in millimetres



b) Top panel B

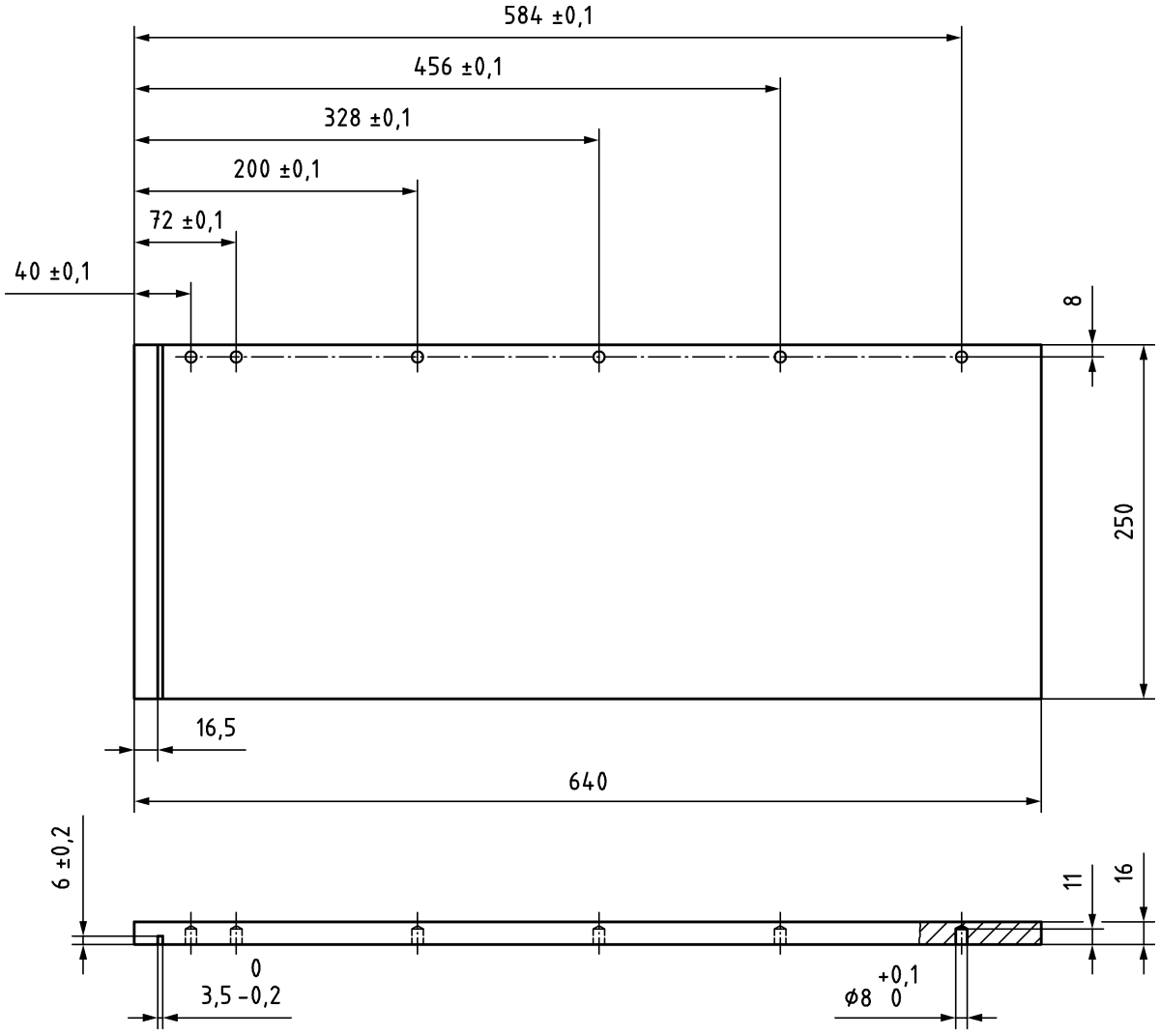
Figure 3 — Top panel, drillings

Dimensions in millimetres



a) Right side panel A (left side panel A laterally reversed)

Dimensions in millimetres



b) Right side panel B (left side panel B laterally reversed)

Figure 4 — Side panels, drillings and groove

6 Test procedures and requirements

6.1 General

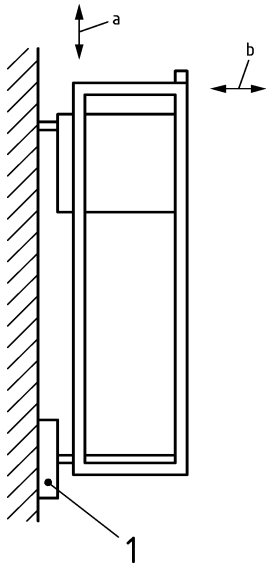
Testing shall be carried out according to one of the following procedures:

— Procedure 1 with a furniture part and a wall part, both provided by the manufacturer;

— Procedure 2 with a furniture part provided by the manufacturer and a non-commercial wall part (4.2.8).

Depending on the type of wall attachment device, the tests shall be carried out with the test frame A and/or B. The tests according to 6.2 shall be carried out with the same set of wall attachment devices for each frame (A or B). The test frame shall be attached to the test wall, so that the top is horizontal and the sides are vertical.

Adjustable wall attachment devices shall be adjusted to the maximum depth (as far from the wall as possible) and to the mid of the height adjustment range. ▌A1⟩ The unit shall then be levelled by means of distance devices (4.2.7) placed as low and as far apart as possible (see Figure 5). ⟨A1▌.



Key

1 distance device with the melamine side facing the test frame

a height adjustment

b depth adjustment

Figure 5 — Side view of test frame and test wall

6.2 Verification of loading capacity

6.2.1 Requirements

After testing according to 6.2.2, 6.2.3, 6.2.4 and 6.2.5, the test frame shall remain attached by its mountings and shall support the test load. The wooden top panel shall not touch the test frame.

After the door swing test (6.2.4) and the removal of all loads, the wall attachment devices shall not show loss of function and shall maintain their adjustability functions. When operating the adjustability devices for the full adjustment ranges specified by the manufacturer the test frame shall not become detached.

6.2.2 Static load test

The total load including the test frame shall be the loading capacity (M) of one wall attachment device × 1,4 × the number of wall attachment devices.

Apply the load uniformly on the bottom panel.

The loading time shall be one hour.

NOTE 1,4 is a factor used to simulate testing for one week as used in ISO 7170 [1].

6.2.3 Impact test

The impact test shall be carried out as soon as possible after finishing the static load test and with the static load (6.2.2) on the bottom panel.

The steel impact plate (4.2.4) shall be tipped over 10 times on the top panel at the middle of the depth and as close as possible to one side of the test frame (Figure 6a)). The striking surface of the impact plate (4.2.4) shall be that faced with rubber.

Repeat the test on the other side of the test frame.

6.2.4 Door swing test

The door swing test shall be carried out as soon as possible after finishing the impact test and with the static load (6.2.2) on the bottom panel.

The swivel arm shall be mounted on one side of the test frame and shall be loaded with a mass of 30 kg 500 mm from the front of the test frame (see Figure 6b).

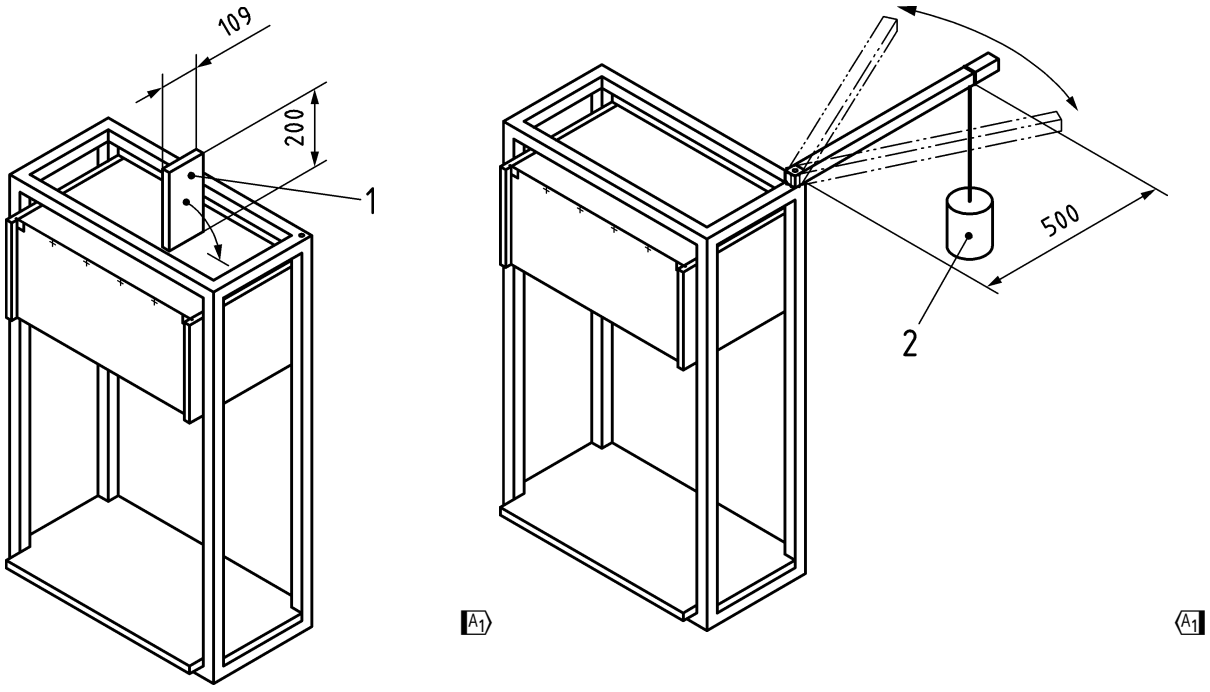
Swing the pivoting arm 10 full cycles (back and forth) from a position 45° from fully closed to a position 135° from fully closed.

Opening and closing can be done by hand using 3 s to 5 s for opening and 3 s to 5 s for closing.

Repeat the test with the pivoting arm mounted on the other side of the test frame.

After the door swing test the static load shall be removed.

Dimensions in millimetres



a) Impact test **b) Door swing test**

Key

1 steel impact plate (4.2.4)

2 30 kg mass

Figure 6 — Impact and door swing tests

6.2.5 Overload test

The total load including the test frame shall be the loading capacity (*M*) of one wall attachment device × 2 × the number of wall attachment devices.

〚A1〛 Apply the load uniformly on the bottom panel and/or on top of the frame. 〚A1〛

The loading time shall be one week.

6.3 Corrosion resistance

The corrosion test shall be carried out when required on a new set of wall attachment devices according to EN ISO 6270-2.

Requirement: 3 cycles AHT (Condensation atmosphere with alternating humidity and temperature).

With the exception of cutting edges, screw slots, rivet heads, aluminium and moulded parts of zinc, all parts, which are visible when the wall attachment devices is mounted, shall show no corrosion.

The function shall be maintained.

If the corrosion test has not been carried out, information on this shall be included in the product information (Annex A).

7 Test report

The test report shall include at least the following information:

a) reference to this European Standard;

b) description of the wall attachment device(s) tested (commercial and/or non commercial wall part);

c) any defects observed before testing;

d) type of test frame(s) used; A and/or B;

e) test results according to 6.2.2 to 6.2.5 and 6.3;

f) details to be included in the product information (see Annex A);

g) details of any deviations from this European Standard;

h) name and address of the test facility;

i) date(s) of test.

Annex A
(normative)

Product information system

A.1 General

The aim of the product information is to assist furniture manufacturers/developers in choosing the correct wall attachment device(s) for a given purpose.

Therefore information shall be given by the manufacturer of the wall attachment device(s) on at least the properties specified in this annex.

A.2 Loading capacity

The product information shall include the loading capacity (capacities) in kg (see 3.1), the minimum number of wall attachment device(s) and a statement for which type(s) of storage furniture the wall attachment device(s) are suitable, i.e. where the height is larger than the depth and/or where the depth is larger than the height.

If test procedure 1 has been used, it shall be clearly stated that the loading capacity can be used as a guide for the loading capacity of a piece of furniture.

If test procedure 2 has been used, it shall be clearly stated that the loading capacity cannot be used as a guide for the loading capacity of a piece of furniture.

A.3 Adjustment systems

The product information shall include information on all possible adjustments.

A.4 Corrosion test

The product information shall include information on whether the corrosion test has been carried out and whether the requirement has been fulfilled.

A.5 Mounting instructions

The product information shall include information on the correct mounting of the wall attachment device(s).

Annex B
(informative)

Determination of loading capacity

B.1 Determination of breaking load

If the breaking load is not determined, the following test method may be used.

For the determination of breaking load, 5 tests shall be carried out using new wall attachment devices and new particle board.

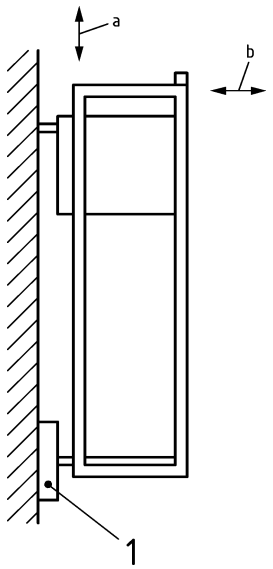
The test frame shall be attached to the test wall so that the top is horizontal and the sides are vertical. The wall attachment shall not influence the loading capacity of the wall attachment devices.

The wall attachment devices shall be adjusted to the most adverse position permitted by the manufacturer. This is normally when attached to the maximum depth, to the mid of the height and to the maximum side adjustment.

[A1] The load shall be carefully placed and uniformly distributed on the bottom panel and/or on top of the frame. [A1]

Every 5 s to 10 s, the load shall be increased by 2 kg.

[A1] Record the last load before the test frame detaches completely or at one side or the wooden top panel touches the test frame. [A1]



Key

1 distance device
a height adjustment
b depth adjustment

Figure B.1 — Side view of test frame and test wall

B.2 Calculation of loading capacity, M

In cases where the loading capacity is not specified by the manufacturer, the load capacity shall be calculated on the basis of 5 breaking loads (B.1) according to the following formula:

$$M = \frac{M\mathrm{m} - 2 \cdot S}{\mathrm{n} \cdot K \cdot 1,4}$$

where

M_m is the mean value of the breaking loads

M is the load capacity in kg of one wall attachment device

S is the standard deviation calculated according to ISO 16269-6:2005 [2]

n is the number of wall attachment devices

K is a calculating factor as follows:

K = 2 for wall attachment devices where all loading bearing parts are made of steel

K = 3 for wall attachment devices made of all other materials

The calculated value rounded to the nearest 10 N is the loading capacity *M* of one wall attachment device.

Bibliography

[1] ISO 7170, *Furniture — Storage units — Determination of strength and durability*

[2] ISO 16269-6:2005, *Statistical interpretation of data — Part 6: Determination of statistical tolerance intervals*

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