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Hardware for furniture — Strength and loading capacity of shelf supports

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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Quincaillerie d'ameublement - Résistance mécanique et capacité de charge des supports d'étagère

Möbelbeschläge - Festigkeit und Tragfähigkeit von Bodenträgern

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Foreword

This document (EN 16337:2013) 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of an identical text or by endorsement, at the latest by December 2013, and conflicting national standards shall be withdrawn at the latest by December 2013.

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1 Scope

This European Standard specifies test methods for the verification of the loading capacity of shelf supports.

This standard does not apply to ceiling attached shelf support systems.

The tests consist of the application of vertical 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 6.4, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes.

The strength tests include only the shelf supports and their components as well as the attachment to the cabinet and/or to the wall. If the shelf support has additional functions, e.g. as a connector or as an extension element, these are not covered by this standard.

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

The test results can only be used as a guide to the performance of the shelf supports.

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 (normative) includes test parameters.

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

2 Normative references

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.

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

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

EN 14322, *Wood-based panels - Melamine faced boards for interior uses - Definition, requirements and classification*

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

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, for one shelf support as specified by the manufacturer for which the shelf support will fulfil the strength requirements specified in this standard

4 General test condition

4.1 Preliminary preparation

The shelf supports shall be mounted/assembled according to the instructions supplied with them. The most adverse configuration shall be used and the mounting/assembly method shall be recorded in the test report.

In case of wall mounted shelf supports more than one shelf may shall be mounted and tested.

Any fixing of the shelf supports to the test wall shall be such that its strength does not influence the test result.

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.

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

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.

Shelf supports 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 7 days before testing.

Before beginning the testing, visually inspect the shelf supports 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 and flat surface constructed in a way 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	(650 ± 50) kg/m^3

4.2.3 Melamine faced particleboard

The melamine faced particleboard used for the shelf shall be according to EN 14322.

4.2.4 Steel impact plates

Two steel impact plates, each one faced with a 3 mm thick layer of rubber with hardness of (85 ± 10) IRHD according to ISO 7619-2:

— a 2,5 kg impact plate, 200 mm × 160 mm × 10 mm;

— a 1,7 kg impact plate, 200 mm × 109 mm × 10 mm.

4.2.5 Masses

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

NOTE Steel masses with a length of 85 mm, a width of 50 mm, a thickness of 30 mm and a mass of 1 kg are suitable.

4.3 Tolerances (allowed variation from the nominal values)

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

Forces: ± 5 % of the nominal force;

Masses: ± 1 % of the nominal mass;

Dimensions: ± 1 mm of the nominal dimension;

Angles: ± 0,2° 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 set-up

The test set-up shall be as follows:

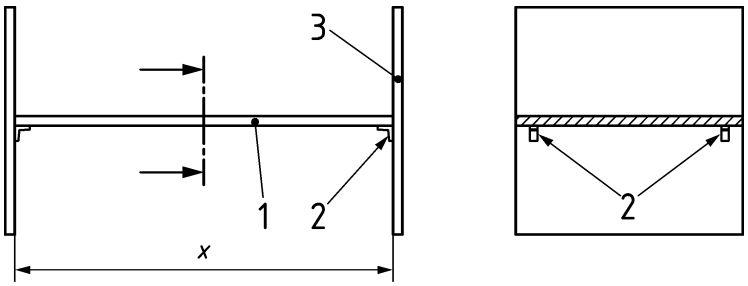
a) the test set-up (except shelves) shall be constructed so that the deformation under the applied loads is no more than 1 mm;

b) for cabinet mounted shelf supports the sides for wooden materials (Figure 1, Pos. 3) shall be 19 mm reference particle board (see Table 1) with a depth of 600 mm (test shelf A) or 300 mm (test shelf B); the sides for other materials, e.g. glass, metal or plastic shall be as specified by the manufacturer; the clear distance between the sides shall be 1 000 mm, unless otherwise specified; the centre of the shelf supports shall be positioned 37 mm from the front and rear of the sides; or

for wall mounted shelf supports (see Figure 2), the test wall (4.2.1) shall be used; the distance between the shelf supports shall be as specified by the manufacturer;

c) the shelf (Figure 1, Pos. 1) shall be 19 mm melamine faced particle board (4.2.3), the depth shall be 600 mm (shelf A) or 300 mm (shelf B) or as specified by the manufacturer, the length shall be 0,5 mm to 1,0 mm (where the tolerance according to 4.3 does not apply) shorter than the clear distance between the sides (Figure 1, *x*);

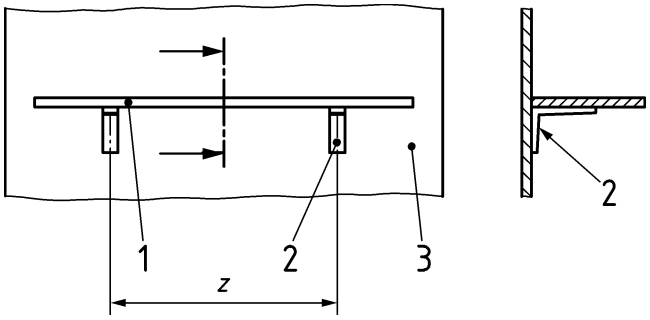
the height from the bottom of the test frame to the shelf support shall be 100 mm or more.



Key

1 shelf (5. c)
2 cabinet mounted shelf supports (5. b)
3 particleboard sides (5. b)
x clear distance between the sides (5. b)

Figure 1 — Test set-up example, cabinet mounted shelf supports



Key

1 shelf (5. c)
2 wall mounted shelf supports (5. b)
3 test wall (4.2.1)
z centre to centre distance between the shelf supports (5. b)

Figure 2 — Test set-up example, wall mounted shelf supports

6 Test procedures and requirements

6.1 General

For the following tests, two sets of shelf supports shall be used as follows:

a) the first set shall be used for the impact test and the sustained load test specified in 6.3.2 and 6.3.3;

b) the second set shall be used for corrosion test specified in 6.4, if relevant.

All tests in 6.3 shall be carried out on the same sample.

6.2 Strength requirements and tests

After testing, the shelf supports shall not show any damage that affect safety and the function shall not be impaired.

The downwards inclination of loaded wall mounted shelves shall not have increased more than 2° in relation to the unloaded initial state.

6.3 Verification of loading capacity

6.3.1 General

The verification of the loading capacity consists of two tests, i.e. the impact test and the sustained load test.

6.3.2 Impact test

For wall mounted shelf supports record the inclination of the unloaded shelf.

The test load shall be the loading capacity, *M* (3.1) × the number of shelf supports × 2.

The test load shall include the weight of the shelf.

The test load shall be distributed on the shelf without impacts, so that the impact plate (see Annex B) can be tipped over as shown in Figure 3.

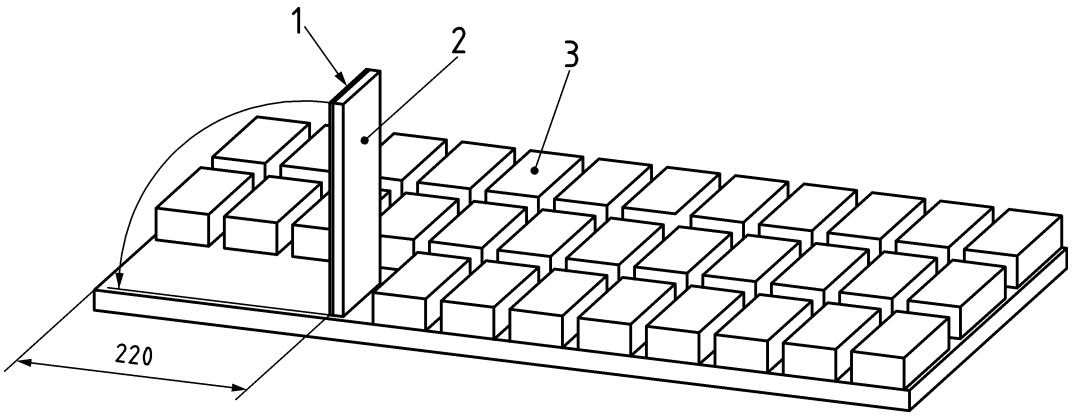
The impact shall be directly above each shelf support (see Figure 4 and Figure 5).

Each shelf support shall be tested a total of 10 times.

For wall mounted shelf supports, the impact test shall be carried out both at the front (5 ×) and at the rear (5 ×) of the shelf support.

Assessment shall be carried out according to 6.2.

Dimensions in millimetres



Key

1 Rubber layer
2 Steel impact plate (4.2.4)
3 Masses (4.2.5)

Figure 3 — Impact test, principle

Dimensions in millimetres

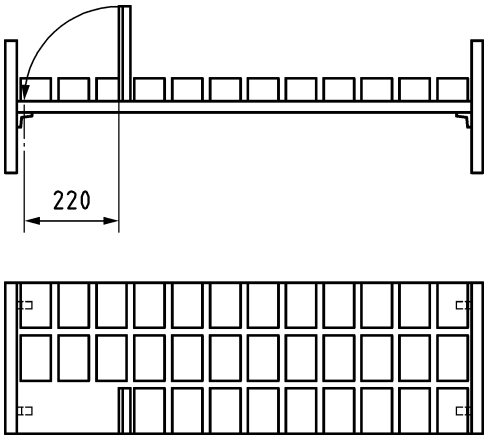


Figure 4 — Impact test for cabinet mounted shelf supports, principle

Dimensions in millimetres

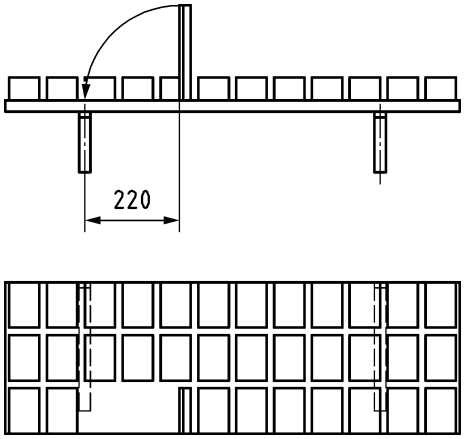


Figure 5 — Impact test for wall mounted shelf supports, principle

6.3.3 Sustained load test

Re-distribute the test load (6.3.2) without impacts, so that it is uniformly distributed over the whole shelf area.

The loading time shall be one week.

After the test with the load on, measure the inclination of the shelf of wall mounted shelf supports.

Assessment shall be carried out according to 6.2.

6.4 Corrosion resistance

The corrosion test shall be carried out when required on the second set of shelf supports 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 shelf support is mounted, it shall show no corrosion.

The function shall be maintained.

7 Test report

The test report shall include at least the following information:

a) reference to this European Standard and the applied requirement document;

b) detailed description of the shelf supports tested;

c) any defects observed before testing;

d) test results;

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

f) name and address of the test facility;

g) date(s) of test.

Annex A
(normative)

Requirements for product information

A.1 General

The aim of the product information is to assist furniture manufacturers/developers in choosing the correct shelf supports for a given purpose. Therefore, information shall be given by the manufacturer of the shelf supports on at least the properties specified in this annex.

A.2 Field of application

The product information shall include information regarding the material(s) for which the shelf support(s) are suitable, e.g. solid wood, particle board, glass and the maximum shelf dimensions.

A.3 Loading capacity, *M*

The product information shall include:

— the loading capacity, *M* in kg for one shelf support, or if relevant, for a system of shelf supports; and

— the impact test results (test passed with 1,7 kg or 2,5 kg).

A.4 Adjustment systems

The product information shall include information on all possible adjustments.

A.5 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.6 Mounting instructions

The product information shall include information on the correct mounting of the shelf supports, including type and dimension of fasteners as well as a mounting drawing.

Annex B
(normative)

Test parameters for impact plates (4.2.4)

The test parameters shown in Table B.1, column 1 and 2 are considered to be suitable for shelf supports for most fields of application.

Table B.1 — Impact test parameters

Test	Unit	1	2
Impact test (6.3.2)	kg	1,7	2,5

Annex C
(informative)

Determination of loading capacity

C.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, five tests should be carried out using new shelf supports and new shelves.

Depending on the kind of shelf supports the test configuration according to Clause 5 should be used.

The shelf supports should be adjusted to the most adverse position permitted by the manufacturer.

The load should be carefully placed and uniformly distributed on the shelf.

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

Record the last load before the shelf detaches completely or at one side.

C.2 Calculation of loading capacity, *M*

In cases where the loading capacity is not specified by the manufacturer, the loading capacity should be calculated on the basis of 5 breaking loads (C.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 loading capacity in kg of one shelf support

S is the standard deviation calculated according to ISO 16269-6:2005 [1]

n is the number of shelf supports

K is a calculating factor as follows:

K = 2 for shelf supports where all loading bearing parts are made of steel/metal

K = 3 for shelf supports devices made of all other materials

The calculated value rounded to the nearest 10 N is the loading capacity, *M* of one shelf support.

Bibliography

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

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