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Hardware for furniture — Strength and durability of locking mechanisms

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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 endurance des mécanismes de verrouillage

Möbelbeschläge - Festigkeit und Dauerhaltbarkeit von Verschlussmechanismen

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Foreword

This document (EN 16014:2011) 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of an identical text or by endorsement, at the latest by February 2012, and conflicting national standards shall be withdrawn at the latest by February 2012.

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Introduction

The aim of this European Standard is to provide furniture manufacturers, designers and developers with comparable information regarding the performance of all types of locking mechanisms.

NOTE Examples of typical locking mechanisms are given in CEN/TR 16015.

1 Scope

This European Standard specifies test methods and requirements for the strength and durability of all types of locking mechanisms for furniture and their components for all fields of application.

This European Standard does not apply to latching mechanisms.

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

With the exception of the corrosion test in 6.5, the tests are designed to evaluate properties without regard to materials, design/construction or manufacturing processes.

The strength and durability tests only relate to the locking mechanisms and their components and the parts used for the attachment, e.g. screws.

The strength and durability tests are carried out in particle board with specified properties. The test results can only be used as a guide to the performance of a piece of furniture.

The test results are only valid for the locking mechanisms and their components 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 corrosion, ageing and influences of heat and humidity is not included.

Annex A (normative): Product information system.

Annex B (normative): Test parameters.

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.

EN 320:2011, *Particleboards and fibreboards - Determination of resistance to axial withdrawal of screws*

EN 323:1993, *Wood-based panels — Determination of density*

EN ISO 6270-2:2005, *Paints and varnishes — Determination of resistance to humidity — Part 2: Procedure for exposing test specimens in condensation-water atmospheres (ISO 6270-2:2005)*

3 Terms and definitions

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

3.1
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.

[ISO 7170:2005 and EN 14074:2004]

3.2
latch
mechanism which retains an extension element or a door in the closed position

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

3.3
stop
part of hardware in the cabinet which works together with the locking hook

[CEN/TR 16015:2010, 2.5.1]

4 General test conditions

4.1 Preliminary preparation

The locking mechanism shall be assembled/mounted according to the instructions supplied with it.

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 must be changed to produce the worst-case conditions, this shall be recorded in the test report.

For testing a range of related locks, 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.

Locking mechanisms 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.

If a test cannot be carried out as specified in this standard, 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 far as possible as specified.

Before beginning the testing, visually inspect the lock 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

The equipment shall not inhibit deformation of the lock, i.e. it shall be able to move so that it can follow the deformation of the lock during testing.

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 forces in the static load tests shall be applied sufficiently slowly to ensure that negligible dynamic force is applied. Unless otherwise specified, each force shall be maintained for not less than 10 s and not more than 15 s.

The forces in durability tests shall be applied at a rate to ensure that excessive heating does not occur.

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

4.4 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;

— 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.

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

4.6 Inspection and assessment of results

Before and after completion of each test, carry out the inspection as specified, after using adjustment devices, if available.

Record any changes that have taken place since the initial inspection. The inspection shall include at least the following:

a) the fracture of any component or joint;

b) the loosening of any joint intended to be rigid, which can be demonstrated by hand pressure;

c) the deformation or wear of any part or component such that its functioning is impaired;

d) the loosening of any means of fixing components;

e) any impairment of a component or part.

5 Test apparatus

5.1 Loading pad

— Type A: rigid cylinder with a flat face; the diameter of which shall be 2/3 of the smallest width or diameter of the lock tested;

— Type B: rigid cylinder, (5,0 ± 0,1) mm diameter, with a hemispherical face;

— Type C: test bolt identical in shape and form to the part belonging to the locking mechanism.

5.2 Test plates

The tests specified in 6.2 and 6.3 shall be carried out in a test plate, which is so constructed that the deformation at the measurement points under the applied load is no more than 1 mm. The test plate shall be at least 50 mm larger than the lock to be tested.

Unless otherwise specified by the manufacturer, the locks shall be mounted on a 19 mm particle board, see 5.3.

5.3 Particle board properties

The properties of the particle board shall be as specified in Table 1.

Table 1 — Particle board properties

Property	Reference standard	Requirement
Axis withdrawal of screws	EN 320	1 100 N ± 100 N
Density	EN 323	0,65 g/cm³ ± 0,05 g/cm³

6 Test procedure and requirements

6.1 General

For the following tests, five sets of locking mechanisms shall be used as follows:

— the first set shall be used for the tests specified in 6.2;

— the second set shall be used for the tests specified in 6.3;

— the third set shall be used for the test specified in 6.4.1;

— the fourth set shall be used for the test specified in 6.4.2;

— the fifth set shall be used for the test specified in 6.5.

6.2 Overload tests

6.2.1 General

All locking mechanism shall be tested according to all relevant sub-clauses.

The load shall be applied perpendicular to the face of the test plate.

6.2.2 Lock

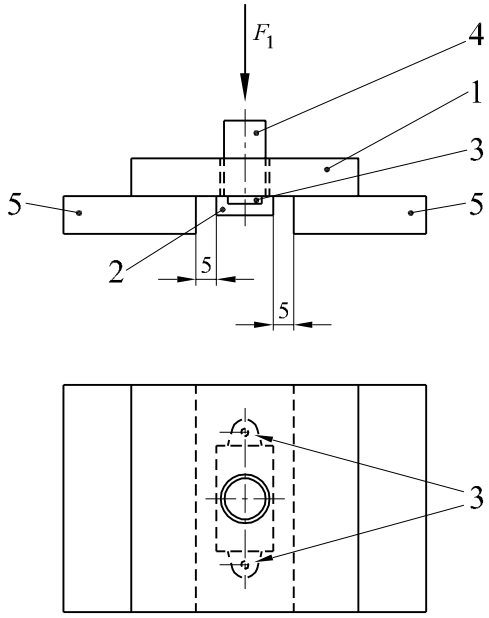
The overload test shall be carried out as shown in Figure 1 using loading pad A (see 5.1) with the static force F_1 and the cycles specified in Table B.1.

The force shall be applied in the opposite direction of the fixing of the lock.

Carry out inspection and assessment according to 4.6 without the test load.

The locking mechanism or parts of it shall not become detached.

Dimensions in mm



Key

1 reference particle board
2 lock
3 fixing
4 loading pad
5 test plate
F_1 force in N

Figure 1 — Example for an overload test of a lock

6.2.3 Bolt

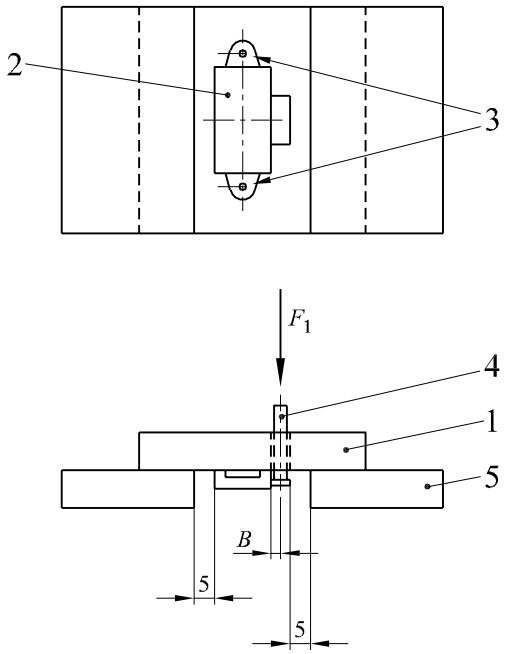
The overload test shall be carried out in the locked position as shown in Figure 2 using loading pad B (see 5.1) with the static force F_1 and the cycles specified in Table B.1.

The force shall be applied in the centre of area of the bolt.

Carry out inspection and assessment according to 4.6 without the test load.

The locking mechanism or parts of it shall not become detached.

Dimensions in mm



Key

1 reference particle board
2 lock
3 fixing
4 loading pad
5 test plate
B centre area of the bolt
F_1 force in N

Figure 2 — Overload test – Bolt

6.2.4 Shooting bar

The overload test shall be carried out in the locked position as shown in Figure 3 using loading pad B (see 5.1) with the static force F_2 and the cycles specified in Table B.1.

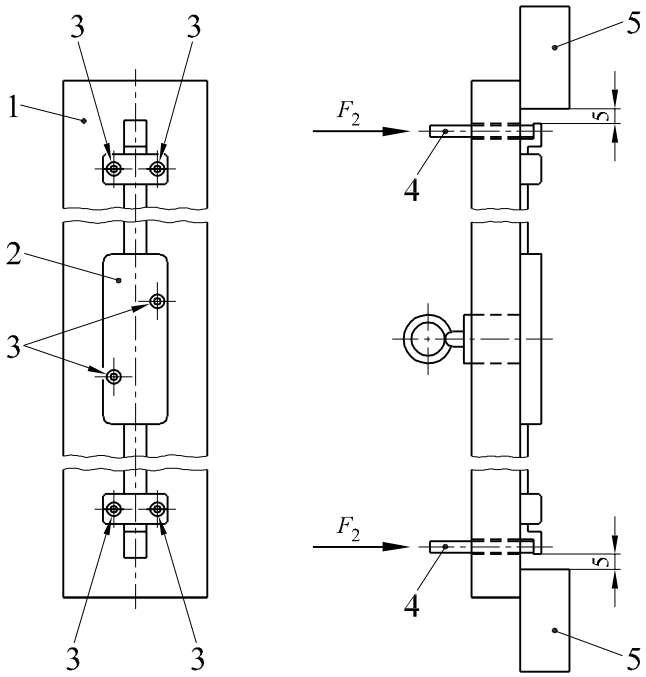
The force shall be applied in the middle of the width of the shooting bar, 5 mm distance from the ends.

If applicable, both ends shall be tested separately.

Carry out inspection and assessment according to 4.6 without the test load.

The locking mechanism or parts of it shall not become detached.

Dimensions in mm



Key

1 reference particle board
2 lock
3 fixing
4 loading pad
5 test plate
F_2 force in N

Figure 3 — Example for overload test of a shooting bar

6.2.5 Locking hook

The overload test shall be carried out in the locked position as shown in Figure 4 using loading pad C (see 5.1) with the static force F_2 and the cycles specified in Table B.1.

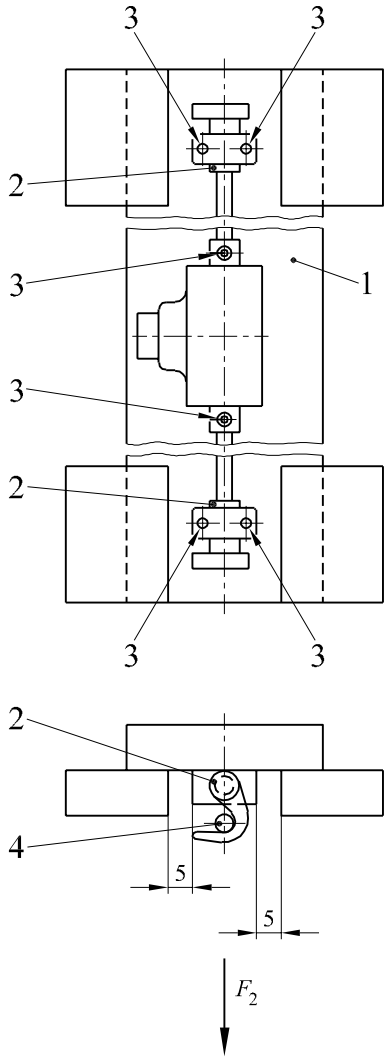
The force shall be applied at the position of the stop specified in the manufacturer's instructions.

If applicable, both ends shall be tested separately.

Carry out inspection and assessment according to 4.6 without the test load.

The locking mechanism or parts of it shall not become detached.

Dimensions in mm



Key

1 reference particle board
2 lock
3 fixing
4 loading pad
F_2 force in N

Figure 4 — Overload test - Locking hook

6.3 Functional tests

6.3.1 General

After the tests, the distance at the measuring points between the lock and the particle board shall not be more than (1,0 ± 0,1) mm, see Figure 5 to Figure 8, the function of the lock shall be maintained and the bolt shall show no permanent deformation, which prevents the correct function.

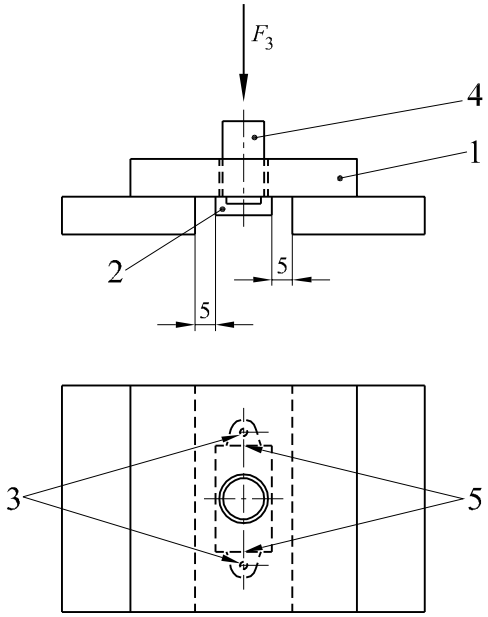
6.3.2 Locks

The functional test shall be carried out as shown in Figure 5 using loading pad A (see 5.1) with the static force F_3 and the cycles specified in Table B.2.

The force shall be applied in the opposite direction of the fixing of the lock.

Carry out inspection and assessment according to 4.6 without the test load.

Dimensions in mm



Key

1 reference particle board
2 lock
3 insert or screw
4 loading pad
5 measurement point between particle board and lock
F_3 force in N

Figure 5 — Functional test – Lock

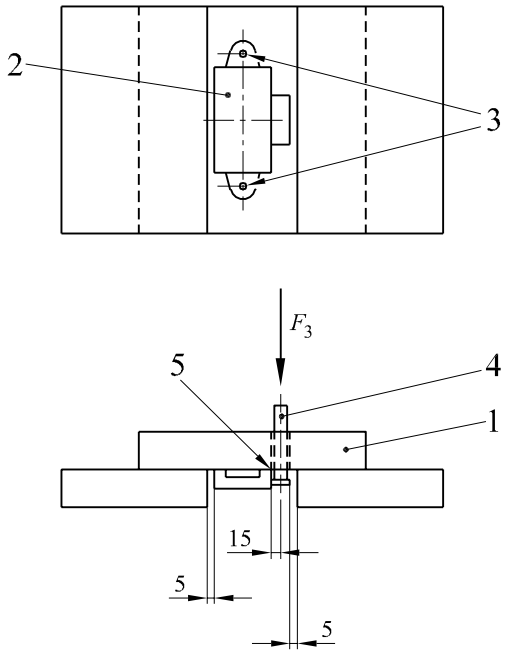
6.3.3 Bolt

The functional test shall be carried out in the locked position as shown in Figure 6 using loading pad B (see 5.1) with the static force F_3 and the cycles specified in Table B.2.

The force shall be applied in the centre of area of the bolt.

Carry out inspection and assessment according to 4.6 without the test load.

Dimensions in mm



Key

1 reference particle board
2 lock
3 insert or screw
4 loading pad
5 measurement point between particle board and lock
F_3 force in N

Figure 6 — Functional test – Bolt

6.3.4 Shooting bar

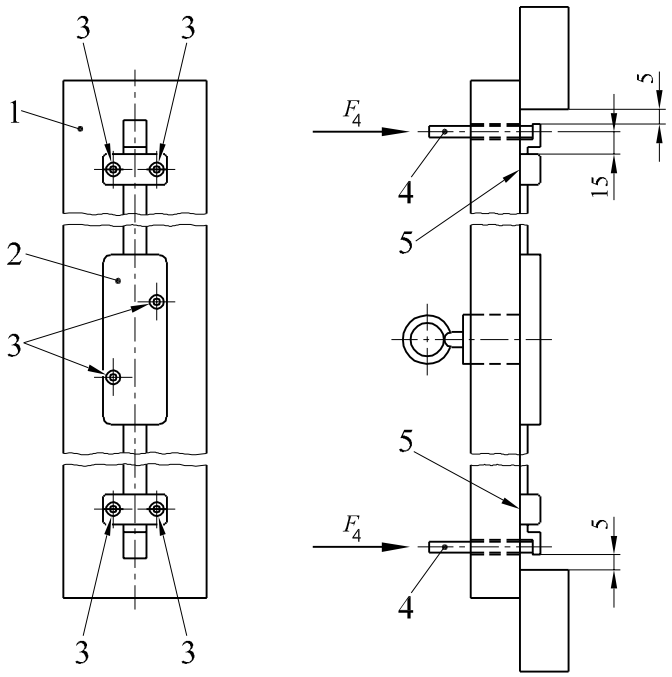
The functional test shall be carried out in the locked position as shown in Figure 7 using loading pad B (see 5.1) with the static force F_4 and the cycles specified in Table B.2.

The force shall be applied in the middle of the width of the shooting bar, 5 mm distance from the ends.

Both ends shall be tested separately.

Carry out inspection and assessment according to 4.6 without the test load.

Dimensions in mm



Key

1 reference particle board
2 lock
3 insert or screw
4 loading pad
5 measurement point between particle board and lock
F_4 force in N

Figure 7 — Functional test - Shooting bar

6.3.5 Locking hook

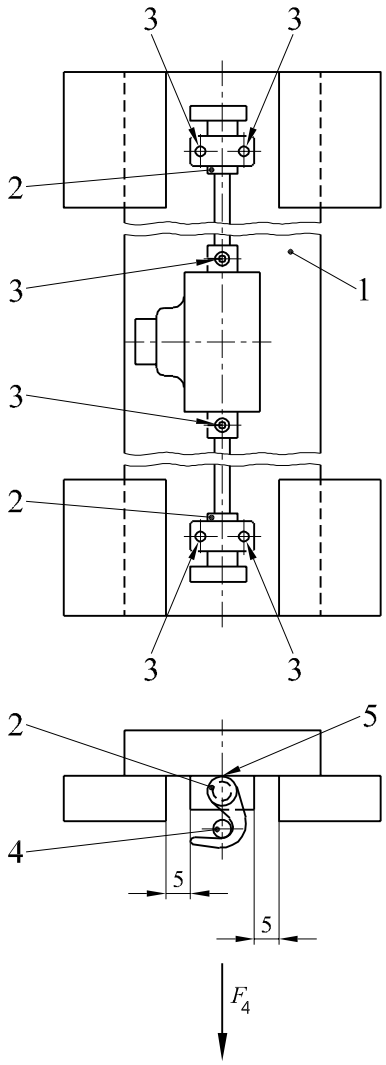
The functional test shall be carried out in the locked position as shown in Figure 8 using loading pad C (see 5.1) with the static force F_4 and the cycles specified in Table B.2.

The force shall be applied at the position of the stop specified in the manufacturer's instructions.

Both ends shall be tested separately.

Carry out inspection and assessment according to 4.6 without the test load.

Dimensions in mm



Key

1 reference particle board
2 lock
3 insert or screw
4 loading pad
5 measurement point between particle board and lock
F_4 force in N

Figure 8 — Functional test - Locking hook

6.3.6 Torque test

Move the key once towards each end position with a moment of 1,6 Nm.

Carry out inspection and assessment according to 4.6.

The locking mechanism shall remain functional.

6.4 Durability tests

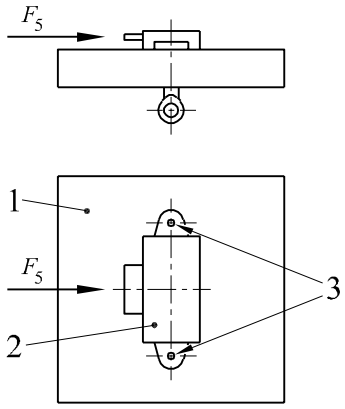
6.4.1 Locks

The durability test shall be carried out as shown in Figures 9 to 11 using the forces and cycles specified in Table B.3. The rate shall be 5 cycles per minute.

The loaded and unloaded lock shall be fully locked and fully unlocked for the number of cycles according to Table B.3, without forcing built-in stops. The key shall remain completely in the lock. The rate shall be (5 ± 1) cycles per minute.

Carry out inspection and assessment according to 4.6.

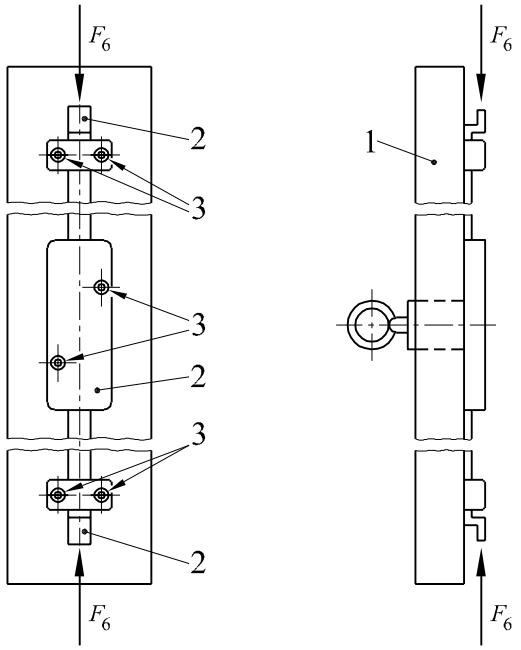
After the test, the lock and its components shall fulfil its functions.



Key

1 reference particle board
2 lock
3 insert or screw
F_5 force in N

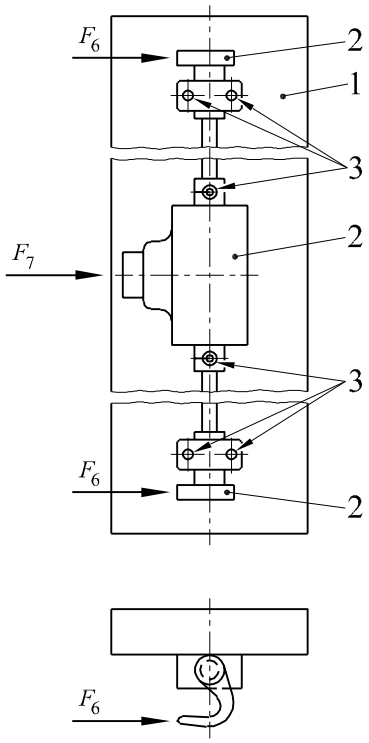
Figure 9 — Durability test - Bolt lock



Key

1 reference particle board
2 lock
3 insert or screw
F_6 force in N

Figure 10 — Durability test - Shooting bar lock



Key

1 reference particle board
2 lock
3 insert or screw
F_6 force in N
F_7 force in N

Figure 11 — Durability test - Espagnolette lock

6.4.2 Cylinder and key

The unloaded lock shall be fully locked and fully unlocked for 20 000 cycles, without forcing built-in stops. The key shall be fully inserted and pulled out not less than 75 % for each cycle. The rate shall be (5 ± 1) cycles per minute.

Carry out inspection and assessment according to 4.6.

After the test, the lock and its components shall fulfil their functions.

6.5 Corrosion resistance

The corrosion test shall be carried out when required on the fifth set of locking mechanisms according to EN ISO 6270-2:2005.

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 locking mechanisms are 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 (see Annex A).

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 locking mechanisms tested;

c) any defects observed before testing;

d) test results according to 6.2 to 6.5;

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

f) test level used;

g) name and address of the test facility;

h) date(s) of test.

Annex A
(informative)

Product information system

A.1 General

The aim of the product information is to assist furniture manufacturers/developers in choosing the correct lock for a given purpose. Therefore, information shall be given by the manufacturer of the lock 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 lock is suitable, e.g. solid wood, particle board, glass.

Information regarding the test results shall be included in the product information (Annex B, level 1 or 2).

A.3 Corrosion resistance

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

Annex B
(normative)

Test parameters

The test parameters shown in Tables B.1, B.2 and B.3, are considered to be suitable for locks for most fields of application from domestic to contract use.

Table B.1 — Overload tests

Force	Unit N Level 1	Unit N Level 2 [a]	Cycles	Pause s
F_1	250	350	5	120
F_2	200			
[a] Level 2 represents movable office furniture.				

Table B.2 — Functional test parameters

Force	Unit N Level 1	Unit N Level 2 [a]	Cycles	Pause s
F_3	200	250	5	120
F_4	150			
[a] Level 2 represents movable office furniture.				

Table B.3 — Durability test parameters

Force	Unit N Level 1	Unit N Level 2	Cycles with load	Cycles without load
F_5	10		5 000	20 000
F_6	7,5			
F_7	5			

Bibliography

[1] CEN/TR 16015:2010, *Hardware for furniture – Terms for locking mechanisms*

[2] EN 14074:2004, *Office furniture — Tables and desks and storage furniture — Test methods for the determination of strength and durability of moving parts*

[3] ISO 7170:2005, *Furniture — Storage units — Determination of strength and durability*

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