

Strength and durability of locking mechanisms: the EN 16014:2011 standard

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The scope of this standard is to define methods and requirements for strength and durability for all types of furniture locks of all types of use. It includes requirements for both bolt locks (Fig. 1) and locks with bars and hooks (Fig. 2).



Fig. 1 example of bolt lock

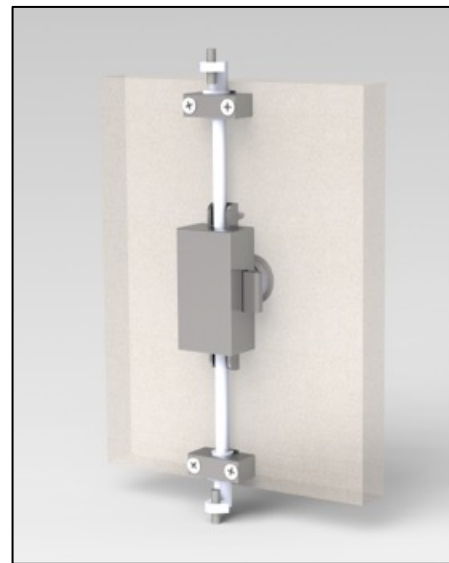


Fig. 2 example of bar lock

To achieve full compliance with the standard, five locks must be tested, one for each type of test; the following are the tests to be performed for a cylinder lock with a key and bolt:

First lock:

- Overload test on lock EN 16014:2011, clause 6.2.2
- Overload test on bolt EN 16014:2011, clause 6.2.3

Second lock:

- Functional load test on lock EN 16014:2011, clause 6.3.2
- Functional load test on bolt EN 16014:2011, clause 6.3.3
- Torque test on key EN 16014:2011, clause 6.3.6

Third lock:

- Durability test on lock EN 16014:2011, clause 6.4.1

Fourth lock:

- Durability test on cylinder and key EN 16014:2011, clause 6.4.2

Fifth lock:

- Corrosion resistance EN 16014:2011, clause 6.5

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The tests are carried out by mounting the lock on a 19 mm panel of particleboard with characteristics specified by EN 320 and 323, using type and number of screws as per the manufacturer's instructions, all fixed on a rigid metal frame. Forces are applied by means of loading pads that vary according to the test to be performed (Fig. 3).

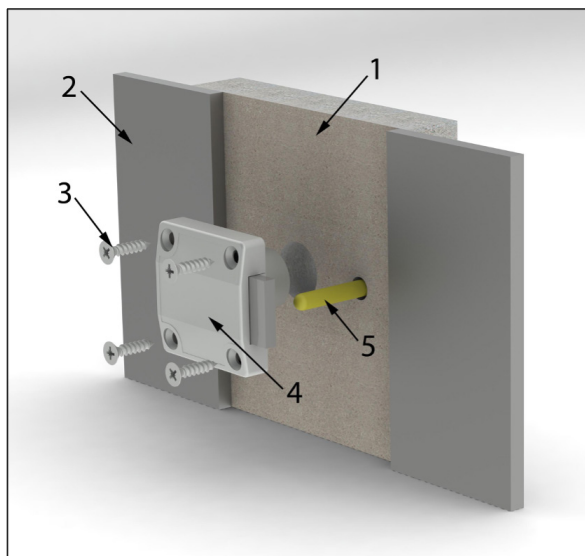


Fig. 3 example of lock to test

Legend:

- 1. 19 mm chipboard panel
- 2. Rigid metal frame
- 3. Fixing screws
- 4. Lock under test
- 5. Loading pad to test the bolt

OVERLOAD TESTS

Overload tests of both lock and bolt are performed on the **first lock**, the standard provides two levels indicating the second for office use.

Test on lock:

The test on lock is performed as shown in Fig.4 with loads and cycles as in Table 1.

The force is applied in the opposite direction to the lock attachment points at the key insertion cylinder.

Table 1

Force F (Livello 1)	Force F (Livello 2)	N° of Cycles	Load application time
250 N	350 N	5	From 10 to 15 s

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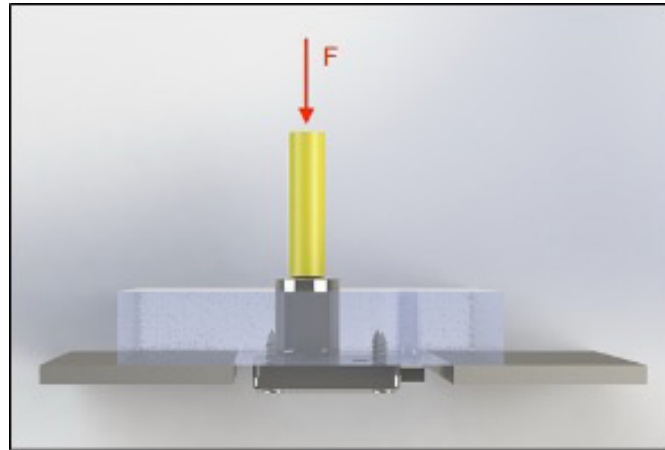


Fig. 4 test on lock (top view)

Test on bolt:

The test on bolt is performed as shown in Fig.5 with loads and cycles as in Table 1.

The force is applied in the direction opposite to the lock attachment points at the fully opened bolt.

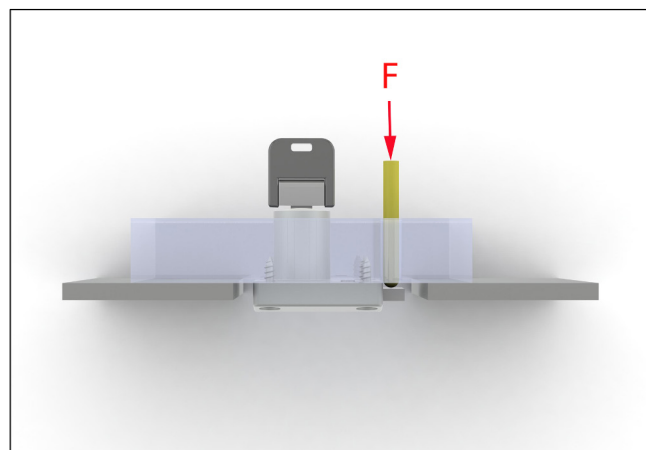


Fig. 5 test on bolt (top view)

FUNCTIONAL TESTS

On the **second lock**, functional tests are performed, in the same manner as the overload tests but with the loads as shown in table 2 of both the lock and the bolt.

After the tests, a torsion test is performed on the same lock with 1.6 Nm both clockwise and counterclockwise on the key.

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Table 2

Force F (Level 1)	Force F (Level 2)	N° of Cycles	Load application time
200 N	250 N	5	From 10 to 15 s

DURABILITY TESTS

A durability test is performed on the **third lock** by turning the key and applying a force F in opposition to the movement of the latch (Fig. 6), then without the application of force as shown in table 3.

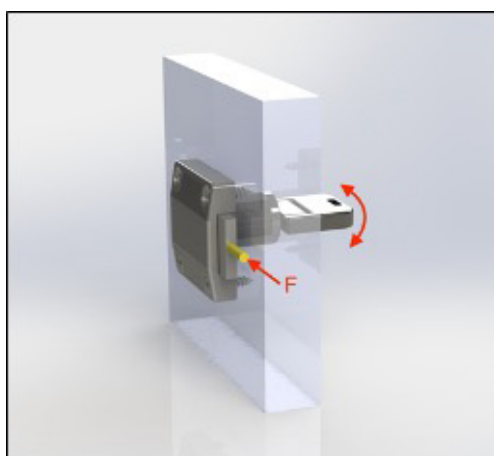


Fig. 6 durability test on lock

Table 3

Force F (Level 1)	Force F (Level 2)	N° of cycles with force 5.000	N° of cycles without force
10 N	10 N	5000	20000

The durability test is performed on the **fourth lock** by turning the key by fully closing and opening the lock for 20,000 cycles, inserting and extracting the key after each cycle.

A corrosion resistance test is performed on the **fifth lock** according to the EN ISO 6270-2:2018 method with the following test conditions: 8 hours at 40±3 °C and 100% relative humidity, 16 hours at temperatures between 18 and 28 °C and 40-70% relative humidity, for a total of 3 cycles.

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