



SLOVENSKI STANDARD

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Stavbno okovje - Obešanke in dodatki za obešanke - Zahteve in preskusne metode

Building hardware - Padlocks and padlock fittings - Requirements and test methods

Baubeschläge - Hängschlösser und Hängschlossbeschläge - Anforderungen und Prüfverfahren

Quincaillerie pour le bâtiment - Cadenas et porte-cadenas - Prescriptions et méthodes d'essai

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EUROPEAN STANDARD

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Building hardware - Padlocks and padlock fittings - Requirements and test methods

Quincaillerie pour le bâtiment - Cadenas et porte-cadenas -
Prescriptions et méthodes d'essai

Baubeschläge - Hängschlösser und Hängschlossbeschläge
- Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 6 December 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 33 "Doors, windows, shutters, building hardware and curtain walling", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by July 2001, and conflicting national standards shall be withdrawn at the latest by July 2001.

This European Standard is one of a series of European Standards dedicated to building hardware products.

Test methods are specified in detail to ensure reproducibility at any testing establishment within Europe, and acceptance criteria are defined objectively to ensure consistency of assessment.

Annexes A and B are normative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European Standard specifies performance requirements and describes test methods for strength, security, function and corrosion of padlocks and padlock fittings used in building applications, but excluding cables and chains.

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Requirements which relate to security are classified in six grades, based on performance tests that simulate attack.

Human intervention test, durability test, manipulation and picking tests are not included in this standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1670:1998, Building hardware - Corrosion resistance — Requirements and test methods.

EN 10025, *Hot rolled products of non-alloy structural steels — Technical delivery conditions.*

3 Definitions and symbols

3.1 Definitions

For the purposes of this European Standard, the following definitions apply.

3.1.1

cam

part of the key mechanism which operates the locking mechanism.

3.1.2

effective differ

difference between key mechanism of similar design, achieved only by the movable detainer, which allows each key mechanism to be operated only by its own key. The number of effective differs is equal to the number of theoretical differs after deduction of the differs suppressed by the manufacturer due to technical constraints.

3.1.3

hasp

part of the padlock fitting which goes over the staple.

3.1.4

key mechanism

part of the mechanism which recognises a correct key

3.1.5

locking mechanism

part of the mechanism which is operated by the key mechanism to lock/unlock the padlock.

3.1.6

padlock

independent locking device comprising a body, a key mechanism, a locking mechanism, and a shackle.

3.1.7

padlock fitting

device fitted to the object which is to be locked with a padlock.

3.1.8

shackle

part of the padlock which passes through and secures the padlock fitting.

3.1.9

staple

part of the padlock fitting through which the padlock shackle is passed.

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3.2 Symbols

For the purposes of this European Standard, the symbols described in table 1 apply.

Table 1

Symbol	Unit	Definition
d	mm	Diameter of shackle
F1	kN	Push/pull force on cylinder plug/locking mechanism
F2	kN	Pull force on shackle and staple
F3	kN	Cutting force on shackle and staple
F4	kN	Maximum possible push/pull force on cylinder plug/locking mechanism
h	mm	Height through which weight is dropped (impact test)
M1	Nm	Torque on key to test for interpassing
M2	Nm	Torque on cylinder plug/locking mechanism
M3	Nm	Twisting torque on shackle and staple
n		Minimum number of effective key differs
t	s	Drilling/sawing resistance time
T	°C	Temperature of product for impact testing
m	g	Drop mass for impact test

4 Requirements

The structure of this clause reflects the classification as given in clause 6. The first five digits of the classification (table 5) are not in use and therefore only corrosion resistance (sixth digit) and the security (seventh digit) are included.

4.1 General

4.1.1 Operational unlocking test

When tested in accordance with 5.1.1 the shackle shall be released.

4.2 Corrosion resistance

Products shall be classified in accordance with EN 1670:1998.

Products intended for internal use shall conform to the minimum requirements for grade 1 (mild resistance).

Products intended for external use shall conform to the minimum requirements for grade 3 (high resistance).

After the corrosion test, the padlock shall operate, using a maximum torque on the key of 2,5 Nm.

4.3 Security

In grades 4, 5 and 6 it shall not be possible to remove the key until the shackle is deadlocked in the closed position.

4.3.1 Minimum number of effective key differs

Padlocks shall have a minimum of n effective differs (table 2).

Maximum number of steps on the same level 60%, maximum two adjacent and a minimum of three levels.

4.3.2 Non-interpassing of keys with just one interval effective differ

When tested in accordance with 5.4.2 it shall not be possible to operate the padlock with keys differing from the correct key by one interval, i.e. the next closest key. The next closest key shall be defined by the manufacturer according to its key coding system.

4.3.3 Resistance to force on cylinder plug or locking mechanism

When tested in accordance with 5.4.3, the cylinder plug or the locking mechanism shall resist a force F_1 (table 2).

4.3.4 Resistance to torque on cylinder plug or locking mechanism

When tested in accordance with 5.4.4, the cylinder plug or the locking mechanism shall resist a torque M_2 (table 2).

4.3.5 Resistance to pulling of shackle and staple

When tested in accordance with 5.4.5, the shackle and the staple shall each resist a force F_2 (table 2).

4.3.6 Resistance to twisting of shackle and staple

When tested in accordance with 5.4.6, the shackle and the staple shall each resist a torque M_3 (table 2).

4.3.7 Resistance to cutting of shackle and staple

When tested in accordance with 5.4.7, the shackle and the staple shall each resist a force F_3 (table 2).

4.3.8 Resistance to impact on padlock body, shackle and staple at low temperature

When tested in accordance with 5.4.8, the padlock body, the shackle and the staple cooled to temperature T , shall each resist the blows from the steel pole with the mass m and from the height h (table 2).

4.3.9 Resistance to drilling of padlock body, shackle and staple

When tested in accordance with 5.4.9, the padlock body, the shackle and the staple shall each resist drilling for a time t (table 2).

4.3.10 Resistance to sawing of padlock body, shackle and staple

When tested in accordance with 5.4.10, the padlock body, the shackle and the staple shall each resist sawing for a time t (table 2).

Table 2 — Security requirements

Requirement clause number	Requirement	Test method clause number	Test parameter	Grade						Unit
				1	2	3	4	5	6	
4.3.1	Minimum number of effective key differs	5.4.1	n	300	1 000	2 500	5 000	10 000	20 000	-
4.3.2	Non-interpassing of keys with just one interval differ - Torque on key	5.4.2	M1	1	1	1,5	1,5	1,5	1,5	Nm
4.3.3	Resistance to force on cylinder plug or locking mechanism	5.4.3	F1	-	-	4	5	10	15	kN
4.3.4	Resistance to torque on cylinder plug or locking mechanism	5.4.4	M2	-	2,5	5	15	20	30	Nm
4.3.5	Resistance to pulling of shackle and staple	5.4.5	F2	3	5	15	30	70	100	kN
4.3.6	Resistance to twisting of shackle and staple	5.4.6	M3	40	100	200	450	1 200	2 500	Nm
4.3.7	Resistance to cutting of shackle and staple	5.4.7	F3	6	15	25	35	70	100	kN
4.3.8	Resistance to impact on padlock body, shackle and staple at low temperature	5.4.8	T m h	-	-	- 20 1 250 800	- 20 3 050 1 000	- 40 6 550 1 400	- 40 7 150 1 500	°C g mm
4.3.9	Resistance to drilling of padlock body, shackle and staple	5.4.9	t	-	-	-	2	4	8	min
4.3.10	Resistance to sawing of padlock body, shackle and staple	5.4.10		-	-	-	2	4	8	min
NOTE	Classification is in six grades where grade 1 has the lowest requirement.									

5 Test methods

5.1 General

5.1.1 General requirements

The padlock shall be tested in the locked position with the key removed.

Two padlocks/ padlock fittings and their original keys shall be taken at random and submitted for each test.

In the event of one of the original two samples failing the test, the padlocks/ padlock fittings shall be deemed to have failed and a further two shall be tested, both of which shall pass the test.

If the parts to be tested are inaccessible when the product is correctly mounted in accordance with the manufacturer's instructions, the product shall be considered to have passed that test.

A padlock shall be deemed to have been opened when a round bar, of equal cross-section to that of its shackle, can be released. Ability to open can be checked at any time during the test by manipulation with a screwdriver or similar implement (maximum length 200 mm) for a period of 5 s max.

5.1.2 Tolerances

Unless otherwise stated, the following tolerances shall apply :

- force $\pm 2\%$;
- torque $\pm 2\%$;
- mass/weight $\pm 2\%$;
- distance $\pm 2\%$;
- time $\pm 5\text{ s}$;
- temperature $\pm 2\text{ }^\circ\text{C}$.

Unless otherwise stated, the forces shall be applied progressively and without shock to the required load within 1 min.

5.1.3 Test environment

The ambient temperature of the test environment shall be controlled throughout the test to $20^\circ\text{C} \pm 5^\circ\text{C}$ unless otherwise stated.

5.1.4 Test tools

Specification of steel for cutting and impact tests shall be as required in 5.4.7.1 and 5.4.8. All steel used for these tests shall be structural steel E335 defined in EN 10025, heat treated to have a hardness of 60 HRC to 62 HRC.

Specification of steel for torque test shall be as required in 5.4.4. All steel used for this test shall be a structural steel which is strong enough to hold the torque resistance values given in table 2. The tool shall be heat treated to have a hardness of 46 HRC to 48 HRC.

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5.1.5 Sampling

Test sampling and sequencing shall be in accordance with annex A.

5.2 Operational unlocking test

Mount the padlock in a suitable holding fixture, and apply a torque to a fully inserted correct key using a torque-meter, as shown in figure B.1. At no point between locked and unlocked shall the torque exceed 1 Nm.

5.3 Corrosion resistance

Padlocks and padlock fittings shall be classified in two grades as follows.

- Products intended for internal use : EN 1670:1998, grade 1 (mild resistance).
- Products intended for external use : EN 1670:1998, grade 3 (high resistance).

Padlocks shall be tested according to EN 1670:1998, subclause 5.6. Tests 5.2, 5.3, 5.4, 5.5 are not necessary for verifying product performance.

After the test it shall be possible to operate the padlock with its own key using a torque not exceeding 2,5 Nm.

After the test it shall not be possible to open the padlock with its next closest key, see 5.4.2.

The padlock may be lubricated according to the manufacturers instructions before attempting to unlock.

5.4 Security

5.4.1 Number of effective key differs

Check in accordance with 4.3.1 based on manufacturer's information.

The manufacturer shall provide information stating how the required number of differs can be achieved in each padlock.

5.4.2 Non-interpassing of keys

A torque of M1 (table 2) shall be applied to the bow of a correctly inserted next closest key taken from the manufacturer's charts which shall differ from the correct key by one step-up or one step-down at one position only.

5.4.3 Resistance to pulling or pushing of cylinder plug or locking mechanism

The test shall be carried out as a simulated pull test (5.4.3.1), but if the construction of the retaining devices of the key mechanism is weakened by a hole through the padlock, then an actual pull test (5.4.3.2) should be conducted instead.

5.4.3.1 Simulated pull test

Make a hole in the padlock to provide access to the back of the cylinder plug or locking mechanism (without damaging the anchoring arrangements). With padlock mounted in a suitable test-rig, apply the force F4 (table 3) through the hole as shown in figure B.2, to simulate pulling.

The "pulling" force F4 (table 3) for grades 4, 5 and 6 can be reduced if the plug/locking mechanism has sufficient drill resistance. This is determined by the following drill test :

- when testing in accordance with 5.4.9, drill the largest possible hole on the face of the cylinder plug/locking mechanism, in the time allowed ;
- with reference to table 3, determine the maximum possible pulling force, F4 ;
- compare F4 (table 3) maximum with F1 (table 2) and if F4 is less than F1, then use F4, otherwise use F1 in table 2.

Table 3 — Determination of maximum pull force

Diameter of drill, mm	Depth of drilled hole mm	Maximum possible pulling force F4 kN
2,5	3,0	2,5
	5,0	5,0
3,0	3,0	3,5
	6,0	7,0
4,0	4,0	6,3
	8,0	12,6
5,0	5,0	9,8
	10,0	19,6
6,0	6,0	14,2
	12,0	28,3

NOTE 1 Forces for other depths can be determined by linear interpolation or extrapolation.

NOTE 2 If the hole is drilled in the keyway, or if there are other surfaces in the drilled hole which would not provide anchorage for the threads of a pulling screw, the pulling force should be reduced accordingly.